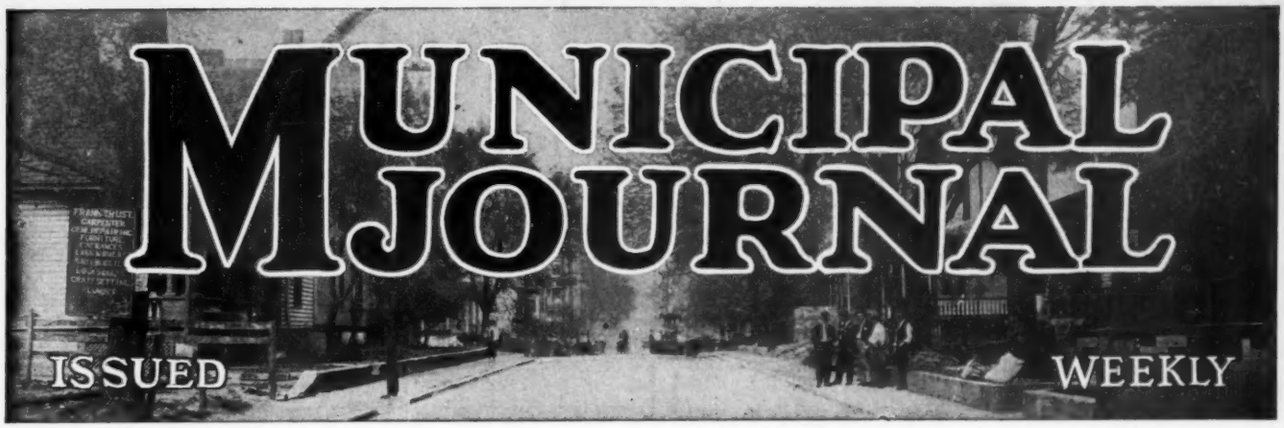

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No. 1

January 4, 1919

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(Signed) PALMER CANFIELD, JR.,
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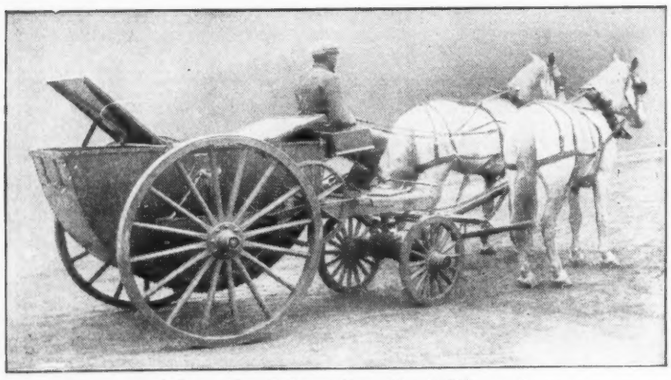

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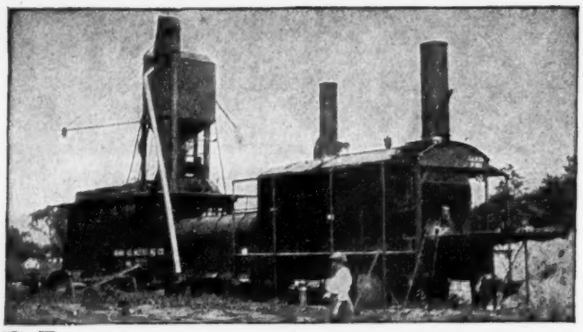

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Municipal Journal

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STREET PAVING IN SAN FRANCISCO

Basalt Blocks for Heavy Traffic, Brick for Steep Grades and Asphalt and Bituminous Concrete for Easy Grades—Methods of Constructing Base and Wearing Surface—Grading Streets—Cost.

Practically all of the standard modern types of pavement can be found in San Francisco, but the engineers endeavor to use each under the conditions for which it is best adapted. As there is no strict city ordinance limiting the loads that trucks may haul, very heavy loads must be provided for on the trucking thoroughfares. After trial of the various pavements, the city has found that basalt blocks stand up best under heavy trucking.

BASALT BLOCK PAVING.

During the past two years this type of pavement has been used in repaving Brannan and Bryant streets, both of which traverse the wholesale and manufacturing districts, where there is much heavy hauling. The same kind of pavement had previously been laid on these streets, but on a ten-inch sand base, and after long, hard use the pavements had become in bad condition. One result of the inadequate method of construction was that the wheels of heavy trucks, when striking the edge of a block, would cause it to tip from the vertical, giving a rough surface to the pavement.

In repaving the streets, the old blocks were first removed and hauled to the yard, where they were redressed to be six to seven inches long, three to three and a half inches wide and five inches deep. The blocks were redressed by contract, the city paying $21 per thousand. (A few weeks ago the city was paying $21.50 per thousand, while in 1917, in recutting the blocks for Brannan street, the price was $17.50 per thousand). These blocks if bought new would cost $65 to $70 per thousand. About one million blocks were used in repaving Bryant street.

Concrete Base. The blocks are laid on a six-inch concrete base with a two-inch sand cushion, the base being composed of one part cement, three parts of graded sand and seven of coarse aggregate; or a proportion of 1:2½:6 is used if the materials employed are better adapted to this proportion. In measuring the aggregate, wheel-barrows are used of such capacity that a certain number, with their contents struck to be exactly full, will give the desired proportion. The water also is measured, it being required that the mixer be equipped with a suitable automatic water tank. Batch mixers only may be used, each batch to remain in the mixer at least one minute, during which time the drum must make not less than fourteen nor more than eighteen complete revolutions. The mixer

FIG. 1—CENTER STRIP OF BASALT BLOCKS WITH SIDE STRIPS OF ASPHALT.

must be provided with a device for counting the number of revolutions of the drum. Machine mixing is required for any work that involves the placing of more than ten cubic yards of concrete or covering a superficial area of more than 500 square feet. If carts or cars are used for transporting concrete, they must be of a type which requires turning the contents over on depositing, and must dump the concrete on a metal platform, from which it is shoveled into place; except that if the length of haul is less than 300 feet it may be dumped in place and immediately spread. After being spread, the concrete is immediately tamped, one tamper being required for each 300 square feet of foundation or fraction thereof placed per hour. For wearing surfaces of basalt or other block type, the surface of the base is not permitted to have projections above the general surface in excess of one-quarter inch.

The finished concrete base is wet on each of two days following its completion and is protected from traffic for at least seven days by covering it with a layer of planking at least two inches thick or by temporarily closing the street in whole or in part.

Wearing Surface. In laying the pavement, the blocks for a distance of 24 inches out from each curb are set in lines parallel with the curb; the blocks for this portion of the pavement being selected with a special view to secure uniformity of width. They are then thoroughly rammed to bring their tops to a uniformly smooth surface. On the rest of the roadway the blocks are set in lines at right angles to the axis of the street. At crossings they are set at angles of 45° with the lines of the streets, the lines of blocks meeting along the center lines of the streets in herring-bone fashion, the diagonal construction beginning at a line two feet outside of the crosswalks.

It is required that the joints of the blocks average not less than one-half nor more than three-quarters of an inch in width. Previous to ramming, the joints are filled with dry, hot, fine gravel which will pass a one-half-inch screen and be rejected by a three-sixteenth-inch screen. When the ramming has been completed the joints are filled with more dry, hot gravel, if necessary to bring this to within two inches of the surface, gravel being raked out of the joints where necessary to secure two inches depth from the top. While the gravel is still warm, the joints are poured full of hot asphaltic cement or paving pitch applied at a temperature of 250° to 350° until the joints will take no more. Fine beach gravel is then spread over the pavement in a thin layer.

On Bryant street the blocks were placed on a two-inch sand cushion, rolled with a five-ton roller, and the joints filled with cement grout. On Brannan street, from Third street to Sixth street, the blocks were set directly on the wet concrete, making a so-called monolithic pavement eleven inches thick. On Bryant street the mixer used was a Foot No. 5 batch mixer operated by a gasoline engine. The crew consisted of eighteen men, which completed an average of 8,000 square feet of concrete a day.

Grading Streets. In preparing for the paving of Bryant street, the grade had to be considerably improved, as it was very uneven, and the street was raised twelve to fourteen inches in some places and lowered an equal amount in others. There are two tracks of a street railway in this street, and it was intended to relay the street railway at the same time that the city carried on the grading; but the railway company was unable to obtain the material for this work and the city was unable to wait longer before making the pavement repairs, so it regraded and repaved the sides of the streets, leaving the tracks in some places above and in others below the new pavement. The street railway, when it regrades and reconstructs its tracks, will be required to repave its right-of-way also.

It is now the practice in San Francisco to widen all of the old roadways when they are paved, and both Brannan and Bryant streets were widened On Bryant street, four feet was taken from each sidewalk, which still leaves sidewalks fifteen feet wide and a roadway 58 feet wide, this giving room for two lines of vehicles on each side of the street car tracks. In widening the roadway it was necessary to move back the catch basins, fire hydrants, etc., also to raise or lower them to conform to the new grade.

In grading Brannan street, it was necessary in some cases to make fills as deep as five feet. Meantime, before the laying of the pavement, the public utility companies rearranged their conduits, pipes, etc., so as to conform to

FIG. 2—REGRADING BRANNAN STREET PRIOR TO PAVING.

the new width of the streets. Water mains also were recalked to minimize the necessity for digging up the street in the future.

Two men were employed in removing the traps from the old catch-basins and the pipes leading from them to the sewer. Unless it was necessary to break down the top of the basin for lowering the street grade, the basins were merely filled up; but the basin heads were moved to the new position and used again. The same men dug the hole for the new catch-basin and a new trench from this to the sewer. The new basin connection was laid and the new basins built by another crew of three men, who averaged from one to three new basins a day, depending upon the obstructions encountered. The basins were made of brick, including the bottom, and the inner surface plastered with one-to-one mortar. Traps were placed in the basins and they were connected with the sewer by means of ten-inch vitrified pipe.

The old stone curb was removed and any pieces that were four feet or more in length and that could be used again were redressed and used, while that that could not be so used was broken up for concrete aggregate or was recut and used for header blocks on the Market street pavement. The new curbing was required to be six inches thick on top and on the bottom and twenty inches deep. The top, and the face for a depth of six inches, were dressed to a true surface, while the back of the stone for a depth of two inches was so dressed that inequalities from a true surface should not exceed one-half inch measured from a straight-edge. In repaving Brannan street, 5,071 feet of old curb was redressed and used again. Stone curbs are being replaced gradually with concrete curbing on practically all streets except those in the heavy hauling districts.

In grading, the subgrade was made fourteen inches below the finished grade. All material that was perishable or unsuitable to support the pavement was removed and replaced with sand or other suitable material. The entire surface of the subgrade was then thoroughly compacted by rolling with a ten-ton roller and by tamping, with the generous use of water, special pains being taken to get the filled-in sections uniformly and thoroughly compacted. After the subgrade had been rolled and checked for surface grade by the engineers, it was covered with planks three inches thick and ten inches wide. This planking was left on the subgrade to protect it, the concrete mixer, the concrete aggregate and the teaming and other handling of material being thus prevented from cutting up the subgrade. The planks were removed only as the concrete was placed. Wherever it was found necessary, the subgrade was thoroughly wet just in advance of laying the base to prevent the absorption of water from the concrete.

Cost of Paving. As an illustration of the cost of basalt pavements, the following figures are given of the cost of six blocks of Brannan street; built in 1916-1917:

			Unit Cost.
Curb—8,090 ft. (410 ft. old):			
Labor and teams	$2,543.43		
Redressing, 5,071 ft. @ 62c	3,144.02		
New curb, 2,609 ft. @ 75c	1,956.75		
		$7,644.20	0.94
Grading:			
Labor and teams	11,167.08		
1066 yds. full @ 10c	106.60		
Concrete—147,600 sq. ft.:			
Labor and teams	5,221.62		
Cement, 9,289 sacks @ 50c	4,644.50		
Crushed rock, 77 yds. @ $1.00	77.00		
Crushed rock, 2,207 yds. @ $1.25	2,758.75		
Sand, 166 yds. @ $1.00	166.00		
		$24,141.55	0.164
Basalt Blocks—130,135 sq. ft.:			
Labor and teams	10,150.33		
Basalt blocks, 650,067 @ $17.50	11,386.81		
Cement, 172 sacks	86.00		
Gravel, 3 yds	3.75		
Asphalt, Grout, @ 4c per sq. ft.	5,205.40	$26,832.29	0.206
Total unit cost of pavement			$0.370

(To be concluded)

SAVANNAH'S DEPARTMENT OF STABLES AND SHOPS.

The City of Savannah maintains, under the charge of Chief Engineer E. R. Conant, a Department of Stables and Shops, the duties of which include the care and feeding of all live stock, the maintenance of and upkeep of all vehicles and rolling stock. All wagons are built new, purchases being only made for wheels, axles and minor castings, used in the construction of same. All harnesses used in the various departments are repaired at the lots and all cart and wagon harnesses are made in the harness shop. All painting required for the rolling stock and vehicles is done in the paint shop, and to a considerable extent outside work is done at the market, maintaining bridges, etc., by the employes of this department. Besides the above, horseshoeing of all stock of departments under the public works office is done without loss of time that would ensue if the work was done by outside parties.

During the year 1917 the average number of stock on hand was 160 head. Only five head of stock died, five were sold, and 18 head of stock were purchased during the fiscal year. Twenty-eight thousand bushels of oats, 560 tons of hay and one ton of mixed feed was purchased.

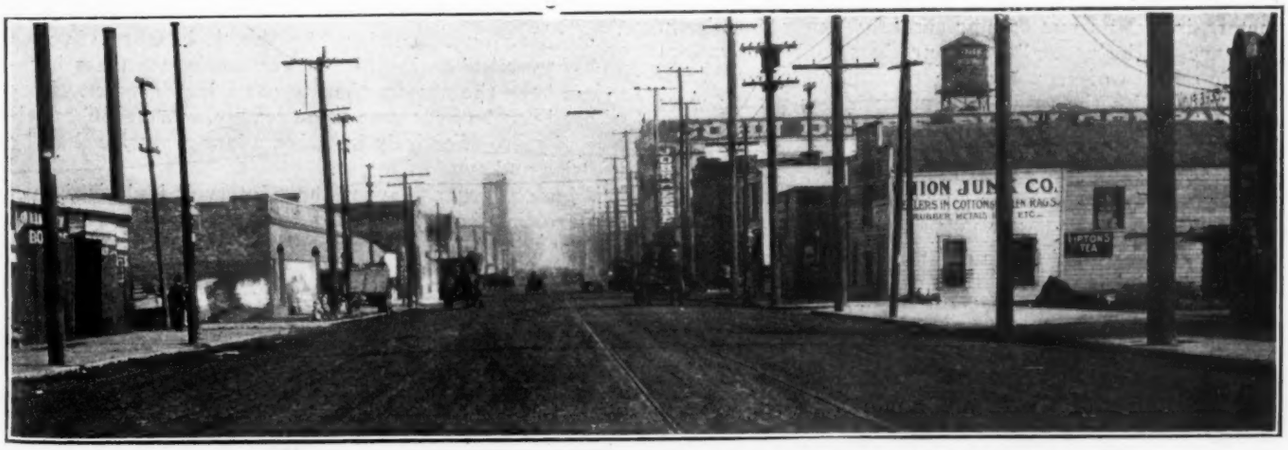


FIG. 3—BRANNAN STREET GRADED AND PAVED WITH BASALT BLOCKS.
View from mid-distance of Fig. 1, looking in the same direction.

The cost of feed for the year, including drayage to the lots, was $38,000. Of this amount $8,000 worth was distributed to the Police and other departments. At the end of the year there was feed on hand valued at $2,000, so that the cost per animal for feeding during the year was $14.50 per month.

The number of two-horse wagons built during the year was eight, the average cost of which was $156. The number of new carts built was ten, the average cost of which was $47; the number of machine brooms refilled, 134, the cost of which was $6.47 each; the number of paper boxes built for use in lanes was 46, at an average cost of $8.00 each. In addition to the routine work done at the shops, the regular force made certain improvements at the City Market, consisting of building 13 chicken coops, 13 tables, closing opening to prevent birds entering the building, plastering and whitewashing several vaults, putting in window frames and glasses, supervising the painting of the Market and other miscellaneous work.

The payroll for the stables and shops amounted to $9,344. With the exception of $1,695 used for the maintenance of buildings and for the office force, this amount is charged against the several departments for which the work was done.

SIZES OF SERVICE METERS*

Practices and Experience of the Passaic Water Company in the Use of Meters, Especially as to the Sizes Most Desirable.

By W. R. EDWARDS.†

The controlling principles involved in determining the size and make of meter service should be economy and efficiency. Usually the water department furnishes the meter, and must keep the capital expense as low as possible, consequently the smallest meter that will do the work in any particular case is desirable. Fortunately the second requirement of efficiency is usually obtained by the same selection.

Oversizing is, in my opinion, a common fault, and it is better to err in the opposite direction, as in that case your attention will be directed to the error by the consumer complaining of poor service, while on the contrary, if the service is oversized in the meter used, a substantial loss may be sustained by the department in underregistration. The oversize meter will not register all the water passing through it and costs more.

Our experience, covering twenty years in time and the setting, care and handling of some twenty-two thousand meters, is that no matter how careful we may have been, we have in the past allowed ourselves to be influenced by the opinion of property owners, mill engineers, architects, etc., with the result that much larger meters were installed than were necessary. That our judgment has been swayed is clear by our experience following the installations of the first five or ten years. A careful watching of the performance of individual meters by following their registration, semi-annual tests as to sensitiveness and accuracy, watching the difference in amount of water recorded following reduction in size or change in type of meter on a particular service, soon made the fact clear that in many cases we had been using meters of too large capacity. This range covered the use of ¾-inch and 1-inch meters for residential service where ⅝-inch was sufficient, to factory or commercial use where from 1½ to 6-inch meters were being used in situations that could better be served by ¾-inch to 2-inch meters.

For the last ten years, during which our business has developed at least 62.8 per cent and the number of meters in use has increased by 99.9 per cent, we have not found it necessary to buy many meters above ⅝-inch in size. The demands of a growing industrial section for meters of a size larger than this has been met by the withdrawal from service of meters which had previously been set larger than necessary; these being replaced by smaller meters or meters of a different type more suitable for the particular service.

RULE ADOPTED FOR METER SIZES.

Our experience has led us to establish a general rule covering residential installation, and this rule is as follows:

Up to 6 families, a ⅝-inch meter,
From 6 to 12 families, a ¾-inch meter,
From 12 to 18 families, a 1-inch meter,
From 18 to 25 or 30 families, an 1½-inch meter.

For commercial or industrial service, the size and type of meter to be used is determined after having considered all the information available as to probable quantity to be used and rate at which it will be drawn. Bearing in mind also, in determining the size, the psychology of the water user and knowing that it is easier to increase than to decrease the size, and that such a change would leave a pleased customer, we are careful not to get an oversize original installation.

The objection of the customer to the placing of a meter of a smaller capacity than his judgment indicates necessary, is usually satisfactorily met by the assurance that if found necessary after trial, a larger size will be installed without expense to him.

Where the service demands a large volume at times, with the necessity of taking care of small flows either of use or leakage, the compound type of meter has been found suitable. This condition frequently arises. For example, for a small-town service, where fire protection is of primary importance but where the ordinary range of draft is greater than that provided for in a Venturi meter of proper size, a compound meter, which has a current meter for the larger demands with a positive measurement meter for the smaller, is the most suitable type. This condition is also met in many public buildings where "flushometers" are installed; although for apartment houses and the smaller tenements where the installation of compound meters of comparatively large size would be necessary to provide for the large flow demanded by flushometers, the use of flushometers is discouraged.

We agree with Mr. Saville in his conclusion in his excellent paper read before the New England Water Works Association on November 14,† that it is more effective and economical to install a larger *service* than has heretofore been the custom than to use a larger *meter*. Loss of head can be overcome more readily, more economically, and more effectively by using a larger service than by the size and type of meter.

Where a larger flow for short intervals is desired than can properly be provided for by the department and still give consideration to accurate registration and first cost of installation, such as filling tubs in a dyehouse (of which we have a great many) or providing for the demands of flushometers, the service may be secured by the use of tanks. This shifts the burden of the extra expense of installation from the water department to the customer, but this is justifiable, in our opinion.

Our invariable rule is to use a meter of smaller size than the service to which it is attached. Installations

*Paper before New York section of American Water Works Association.
†Assistant Superintendent, Passaic Water Company.

†See Municipal Journal for December 7.

are all made so that a meter can be changed to a different size or type readily and with little expense, in order that changes in use or unforseen conditions may be taken care of easily and readily.

The determination of the size of the service and the size and type of the meter to be used for any consumer should be with the water department. The operator of the department does or should know what is required both for proper service to the customer and for economical and efficient service for the department.

All meters larger than 2-inch in size are installed so that they can be tested in service without the interruption of the service, and such tests are made twice yearly. All smaller meters are removed for periodical tests, the period being determined by the service which the meter is rendering, or by the requirements of the State Utility Commission, which requires that all meters must be tested after a fixed number of years of service, or after having passed a certain quantity of water, depending on the size.

In conclusion, we agree again with Mr. Saville, that more care is needed in the selection of meters for particular service. The selection should be made by a man experienced in the supplying of water and with an accurate knowledge of the mechanical qualities of meters, their limitations and possibilities.

Much money can be saved a department both in installation and operating cost, and in securing a full registration of all water delivered, by proper attention to details. Then, after the selection as to size and type has been made, we must not be lulled into false security. The water meter is a machine that needs watching. The department has this pecularity frequently called to its attention by the irate consumer with the high bill, but it should also be warned by the unusually low bill. The price which must be paid for maintaining revenue is eternal vigilance.

DISCUSSION.

In reply to questions, Mr. Edwards said that the company repaired all meters, charging the consumer, however, for repairs due to frost or hot water. One of the towns served by the company is 100 per cent metered, another 80 per cent and a third, 70 per cent. In the first, 65 per cent of the water is accounted for.

WATER MAIN CLEANING IN ST LOUIS.

Methods and Results in Cleaning Fifty Miles of Mains—From Eighty-five to Ninety-three Per Cent Increase in Capacity.

Fifty miles of mains that had been in service for twenty-five years or more in St. Louis, Mo., became so coated with deposits and filled with mud that it was decided by the water department that it would be advisable to have them cleaned. Accordingly, in the fall of 1917 a contract was let for cleaning approximately this total lengths of mains, the sizes of which ranged from 6 inches to 20 inches. The work began shortly thereafter and was continued during 1918. The cleaning is being done by the National Water Main Cleaning Co.

An average of about 8 tons of deposits per mile of main was removed. The increased carrying capacity resulting is shown by the following figures from tests made on three mains, one 20 inches in diameter, one 12 inches and one 6 inches.

The coefficient of flow for the 20-inch was 56 before cleaning, and 108 after cleaning, an increase of 93 per cent; the final coefficient being 97 per cent of that of new pipe.

*Considered as a ring of uniform thickness around the circumference. The probability, however, is that the greater part of the deposit was not so distributed, but was massed in the bottom of the pipe.

The coefficient for the 12-inch was 54 before cleaning, 100 after cleaning—an increase of 85 per cent; the final coefficient being 92 per cent of that of new pipe.

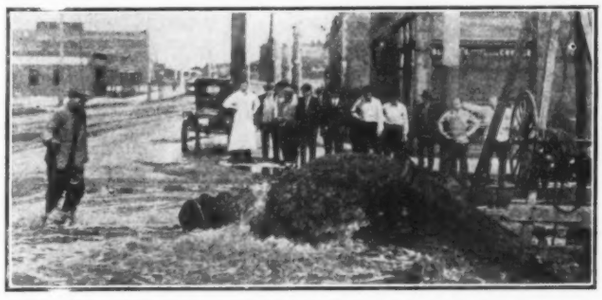
The coefficient for the 6-inch pipe was 48 before cleaning and 92 after, an increase of 92 per cent; the final coefficient being 89 per cent of that of new pipe.

In reporting on this work, William A. Foley, principal assistant and acting engineer in charge of the Distribution Section, said:

"Due to house-to-house inspections, before and after cleaning, consumers were inconvenienced but slightly from choked service connections.

"The incrustation removed in the cleaning process is

While Cleaning Machine Is Moving Through Main.



Just as Machine Is Ejected from Main.

As Water Is Clearing Up.

Clear Water Coming Through Clean Main.
CLEANING 20-INCH WATER PIPE IN ST. LOUIS.

composed of lime, silt and mud, mixed with an iron deposit which adheres firmly to sides of pipe. In addition to this natural incrustation, rocks, sticks and sundry other articles were removed during the cleaning process. A fair estimate of the amount of deposit removed can be gained from the following: 150,500 lineal feet of various sizes cleaned shows an aggregate dry volume of 7,187 cubic feet, amounting to 143 wagon loads, or a little over four wagon loads per mile cleaned.

"The cleaning has been of vast benefit to the department in increased water volume and should be continued until all mains 6 to 20 inches in diameter in service previous to 1906 have been cleaned."

Some of the data concerning the cleaning done up to April 1, 1918, are as follows:

20-inch mains: Total length cleaned, 28,322 ft. Tons of deposit removed, 91.66. Average area of cross-section of deposit, 13.6 sq. in. Average thickness of deposit,* .218 inch.

12-inch mains: Total length cleaned, 77,102 feet. Tons of deposit removed, 127.34. Average area of cross-section of deposit, 6.88 sq. in. Average thickness of deposit,* .186 inch.

8-inch mains: Total length cleaned, 9,951 feet. Tons of deposit removed, 8.88. Average area of cross-section of deposit, 3.72 sq. in. Average thickness of deposit,* .15 inch.

6-inch mains: Total length cleaned, 34,956 feet. Tons of deposit removed, 15.12. Average area of cross-section of deposit, 0.865 sq. in. Average thickness of deposit,* .047 inch.

COLD WEATHER AND MAINS IN DULUTH.

Experiences with Freezing and Thawing of Water and Gas Mains—Services Thawed by Electricity—Ground Froze Eight Feet Deep.

Although the winter weather of 1917-1918 was the most severe and trying to water works superintendents of any for many years past in the majority of cities, in Duluth, Minnesota, the freezing conditions of the winter season of 1916-1917 was much more severe. It may therefore be interesting to narrate some experiences of that winter as it affected the operation of the distribution systems of the Duluth Water and Light Department. The information was furnished us by D. A. Reed, engineer of the department, and E. W. Kelley, the engineer of the department at that time.

The winter of 1916-1917, as experienced at Duluth, was unprecedentedly severe in certain features. From about December 8 to about March 1, noticeable thawing occurred on only one day. During this period the temperature did not reach the extremes that have occasionally occurred, but persistently and almost uninterruptedly remained below the average. Throughout this period of severe cold there was only an insignificant amount of snow.

The combination of low temperature with lack of snow caused the formation of ice and the freezing of ground to depths before unknown to this locality. For instance, in one place on East Fourth street, where the soil is red clay and the paving asphalt, the ground was frozen to a depth of 8.2 feet. At another place on the West End Hillside the frost was about 9 feet, while on the boulevard a thin layer of frozen earth was still in evidence at a depth of 7½ feet about the middle of June. In the past, frost penetration rarely exceeded about 5½ feet.

It is needless to say that frost penetration to such depth was a very serious matter in the operation of a water-plant. The effect most impressive to the public was the freezing of services. That there was reason for these troubles being prominent in the minds of patrons will be realized when it is understood that more than 1,000 services were thawed by the department, while in the preceding winter only 33 services required this operation. This large number of services froze in spite of the widespread publicity given by the newspapers and department bulletins to warnings and advice to allow water to run continuously to prevent freezing.

These warnings and advice were very generally heeded, too, as is evidenced by the pumping station records. The Lakewood records show 6.5 per cent, 5.5 per cent, 19 per cent, 22.5 per cent and 17 per cent increase for the months of January, February, March, April and May respectively, over the corresponding months of the previous year.

The great depth of frost penetration resulted in its presence in the ground until very late. This had one odd effect. In May and early June, the normal load on the pumping stations was greatly exceeded because many consumers were being compelled to allow water to waste to prevent freezing, and at the same time a large amount of water was needed and used for lawn sprinkling.

Services were thawed by electrical methods only. The greater part of this work was done by transformers on horse-drawn vehicles. These transformers drew current at 2,200 volts from the Duluth-Edison Electric Company's primaries and delivered it at 110 volts. The current used was sometimes as high as 500 amperes. In this work one secondary terminal of the transformer was attached to a faucet in the premises being served while the other terminal was connected to a street hydrant or to a faucet in a neighboring house. Ordinarily two or three minutes' application of current from these transformers was sufficient. Unexpected difficulty was encountered in a few cases where several service pipes led from a manifold at the curb to the various premises, all being laid in one trench for a part of the way. In these particular cases, it was evidently possible for the current to shunt around the part of the pipe that was frozen, and in at least one such case it was necessary to dig up and disconnect at the manifold before thawing could be accomplished.

Some use was made of storage batteries and of small transformers. The latter drew current at 110 volts from the house lighting circuits and delivered it at 6 volts. The storage batteries and small transformers were of course slower in getting results than were the 30 K. W. transformers, but their greater portability was a very material advantage.

A gasoline engine-driven generator was ordered early in the winter, but was not delivered early enough to be of any value.

Several mains were frozen, also. These were all 6-inch dead ends, where the cover was not normal. Some of these cases were at ravine crossings where shallow cover is usually compensated for by lodgement of snow; in other cases the main was frozen by the draft through a culvert crossing the main; in another, the street was a rock fill across a depression, and there was apparently a circulation of air through the mass. One of the most exasperating places was on Park Point. In this the street surface is scarcely above lake level; in fact, when the mains were laid, water was standing in the street. If mains are laid more than about two feet below water level they are very difficult of access for tapping or repair, and they were therefore laid at about this depth and consequently with about two feet of cover, at this place. The protection against freezing usually given by

submergence did not avail in this case, and the main froze twice within a week before January first, although two ¾-inch "bleeders" were running wide open. Service had to be abandoned at this place.

Frozen mains were thawed by the use of the large transformers. Arrangements were made for wasting considerable water to the sewer by consumers to prevent repetition of the freezing. In a few instances, sufficient water for this purpose was not wasted at first, and freezing occurred the second time.

The damage done to services by freezing was considerable. The department as late as August was still discovering leaks attributable to this cause. Freezing stretches the lead pipe walls, thus weakening them, or produces breaks at the wiped joints.

There were only a few cases of damage to water mains by freezing, probably because it happened that there was some vent for the pressure generated by the expansion of the freezing water. Both of the above mentioned freeze-ups on Park Point, however, burst several lengths of pipe.

The effects of the abnormal season were not so pronounced on the reservoirs. Ice formed to great depth—that in the Endion reservoir, for instance, was over eight feet deep in places. This naturally resulted in appreciably diminished capacity, and in several places loosened the stone block paving on the embankments.

FROZEN GAS PIPES.

The most troublesome effects of all were met with in the gas distribution system. The mains are laid in the same trench with water mains, but are supported on blocking at a somewhat higher level. Throughout a large proportion of the system the mains were surrounded by frozen earth. Water entering the mains in the warmer portions froze upon reaching those stretches surrounded with frost and formed somewhat extensive plugs of solid ice. The entry of water was in some cases through leaky joints, in others through broken services, while there were a few cases in which the gas main was broken squarely off. There were found several instances of services being lifted bodily from the main at the top, stripping the threads or breaking the street ell at this point. In one case a sewer laid over the gas main was frozen below the crossing, the gas main was snapped off directly under the sewer, and liquid sewage escaping through the sewer joints flowed directly into the gas main, resulting in several long ice plugs, which formed successively in all mains leading to a large district. In consequence the supply to this district was entirely cut off for a week, and from some parts of it for a longer period.

The condensation of moisture from the gas itself was negligible, so far as this trouble was concerned. Overland mains, including the 600-foot crossing over the Aerial Bridge, caused no trouble.

There were also, of course, many cases of stoppage of services by frost. Stoppages in service pipe almost invariably yielded to treatment by injecting wood alcohol and, in some cases, of a mixture of hot brine and alcohol.

Removal of ice plugs in mains, however, was not such a simple matter, as these do not yield to the wood alcohol treatment, while injection of brine, if unsuccessful, results in adding ice to that already present. The street crews state that frozen brine is also harder to remove than frozen fresh water.

Electric current will not thaw gas mains. The explanation of this is as follows: The current merely warms the main and thaws a thin layer of ice next the pipe. In the case of a water main, a hydrant or faucet is always left open downstream from the freeze, and the water therefore begins to flow past the stoppage as soon as the least opening is made, and thus thaws the remaining major portion of the ice plug. In a gas main, however, this does not take place, as the temperature of the gas is usually below the freezing point, and in any case its specific heat it too low for the gas to be effective. The only remedy apparent was therefore to apply live steam directly to the stoppage. The steam was supplied from portable boilers through rubber hose. In some cases success was attained by inserting the hose through 1¼-inch holes tapped in the main. In others, it was necessary to remove a section of main bodily and push the hose against the ice face with jointed sewer rods.

Blowing steam into the mains was not successful in any case. The steam hose must be pushed directly against the ice face and must follow it as it recedes.

The most difficult portion of this work was the location of stoppages and of the points where water was entering. In a fairly well gridironed system this may well be compared with finding the proverbial needle in a haystack. The only available method is to dig up the main at what appears the most strategic point—and then almost invariably to guess again and make another excavation. When it is taken into consideration that it required from 24 to 36 hours of continuous labor to reach the main, it can be faintly understood how slow a process is the restoration of service, even though from three to six crews are working night and day, as was the case in this instance.

CONCRETING IN COLD WEATHER.

The following suggestions for carrying on concrete construction in cold weather are abstracted from a pamphlet issued by the Portland Cement Association under the above title.

Concrete work done when the average temperature is below a certain point may cost a little more than the same kind of work done under the usual summer conditions. On the general run of contracting, this cost seldom runs more than 10 per cent above that of work done in warm weather and frequently not more than 6 per cent—sometimes even less. Part of this extra expense comes from applying necessary protective measures, and part results from the lower efficiency of workmen through exposure to the cold. Some of the increased cost may be due to the added time necessary for the concrete to harden, which prevents such speedy progress of the work as would be possible in warm weather.

Heat hastens the hardening of concrete; cold delays it. The effect of cold becomes noticeable in this respect when temperatures are below 50 degrees Fahrenheit, and becomes more marked with the lower temperatures.

The general opinion is that freezing will not injure concrete that has first had an opportunity to harden for at least 48 hours under favorable conditions. If, before early hardening has taken place, concrete is allowed to freeze and thaw at short intervals, it will be damaged. As a rule, concrete will not show any serious effects from having once been frozen if, after it thaws out, it is not again frozen until early hardening is complete. But it is far better to protect the concrete for two or even four or five days.

Mixing water should be heated to and kept at about 150 degrees. This is generally done by discharging steam into it, or by heating it in tanks or kettles over a fire, or by letting it flow through coils of pipe similar to a steam radiator supported horizontal over a fire.

Sand, pebbles or broken stone are generally heated by piling them above and around an old smokestack, iron culvert pipe or old steam boiler; or on a sheet-iron plate supported above the ground by bricks or stones; a fire being built under the plate or inside the cylinder. The

stone or sand should be turned over at intervals to insure that all parts of the mass are plated. Generally they should not be heated above 150 degrees, as great heat may disintegrate the material.

Use of salt in the water is not recommended. It merely lowers the freezing point of the water somewhat; if more than 10 per cent is used it is likely to weaken the concrete; it delays the setting, may corrode reinforcing steel and cause efflorescence on the surface of the concrete.

Protection of concrete consists of some device for keeping motionless air in contact with it, such as canvas supported above a horizontal surface by beams or slats or suspended near a vertical surface; straw, sawdust, excelsior or other loose material laid on a surface and preferably covered with canvas; or a board or canvas structure built over and around it. In very cold weather salamanders, steam pipes, or steam discharged under the covers may be necessary.

In highway work, concrete should not be placed on a frozen subgrade. Methods to be followed in combating the injurious effects of cold weather may be grouped under the following headings:

(a) Application of artificial heat to materials or finished work, and means of preventing the dissipation of heat developed during the setting of the cement. (Heating of water or aggregates; heating fresh concrete by steam lines; the use of covering, etc.)

(b) Use of chemical compounds which will lower freezing point of mixing water, or hasten setting of the cement.

Special care must be taken to avoid the use of lumps of frozen aggregate. This is generally called to attention in the specifications. On account of the frequent moving of equipment, heating of aggregates is not always practicable in road work, although this can be done in other kinds of concrete construction.

If a source of steam supply is available, aggregate may be treated by inserting steam pipes carrying live steam into the piles. This heating will be greatly facilitated by covering the piles with canvas.

A general summary of the suggestions follows:

During the first few days following the placing of concrete, alternate freezing and thawing at comparatively short intervals will damage it.

Protecting the concrete against possibility of freezing is best, even though concrete which freezes before early hardening has been completed may not be permanently injured, if after thawing out it is not again exposed to freezing until hardened.

It is necessary to so mix, place and protect the concrete that early hardening will be complete before the work is exposed to freezing temperatures. To do this:

(1) Sand and pebbles or broken stone used must be free from frost or lumps of frozen materials.

(2) If these materials contain frost or frozen lumps they must be thawed out before using.

(3) As cement forms but a relatively small bulk of the materials in any batch of concrete, it need not be heated.

Although adding common salt to mixing water will prevent freezing of fresh concrete until it has time to harden, there is a limit to the quantity of salt which may be added if the final strength of the concrete is not to be affected. Salt simply lowers the freezing point of the mixing water; it does not supply what is most needed—heat and warmth. It delays, instead of hastens, the hardening of the concrete.

Sand and pebbles or broken stone and mixing water must be heated so that the concrete when placed shall have a temperature of from 75 to 80 degrees.

Some sands are injured by too much heat. The same applies to certain varieties of pebbles and broken stone. A temperature not exceeding 150 degrees Fahrenheit will generally prove most satisfactory.

Place concrete immediately after mixing so that none of the heat will be lost before placing in the forms.

Warm metal forms and reinforcing before placing concrete. Be careful to remove ice and snow and frozen concrete remaining on the forms from preceding work. Forms can be warmed by turning a jet of steam against them or by wetting with hot water.

Even though materials have been heated and the concrete placed immediately after mixing, it will lose much of its heat if not protected from low temperatures, at once.

Protect the concrete immediately after placing. Canvas covering, sheathing, housing-in the work, or hay or straw properly applied will furnish the required protection for different jobs. In addition to these means, small oil or coke-burning stoves or salamanders may be used in enclosed structures. Guard against dry heat.

Temperatures which may not be low enough to freeze the concrete may, nevertheless, delay its hardening for a considerable time. Do not expect concrete placed when the temperature is low and remains low for some time afterward to be safe for use as soon as though placed during warmer weather.

If concreting is unavoidably delayed or interrupted, the work should be covered until concreting is again begun.

Cover and protect any section of the work as soon as completed. In severe cold weather, continue this protection for at least five days.

Forms must not be removed from the concrete work too early. This applies to any concrete work, regardless of season, but is particularly important with work done during cold weather.

Frozen concrete sometimes very closely resembles concrete that has thoroughly hardened. When frozen concrete is struck with a hammer it will often ring like properly hardened concrete. Before removing forms, examine the work carefully to see whether it has hardened or simply frozen. To determine this, remove one board from some section of a form, pour hot water on the concrete or turn the flame of a plumber's blow torch or a jet of steam under pressure against the concrete. If the concrete is frozen, the heat will soften it by thawing the water contained in it.

GARBAGE DISPOSAL IN NEW YORK.

Comments have been received on that portion of the report of the Pittsburgh committee that was given in our issue of December 14 referring to conditions and experiences in New York City, Lewis L. Tribus, of the firm of Tribus & Massa, making the following statements concerning that section of the report:

The city treasury was to gain nothing from the payments to be made by the Metropolitan By-Products Co., but the moneys were to go to the non mandatory pension fund of the Street Cleaning Department of the boroughs of Manhattan, Bronx and Richmond.

At no time was the Cobwell plant as built, and in many ways an excellent one, able to handle the garbage received for disposal; in fact not over 50 per cent—due, not to lack of labor, but to over optimism as to chemical and mechanical capacity.

The company went into hands of receivers: the State Department of Health declared after very lengthy and thorough investigations and hearings, its operations to be actually and potentially a nuisance. The New York City Department of Health also gave large attention to the matter, and in turn declared operations to be an unqualified nuisance and in violation of contract, and forthwith closed the plant absolutely.

The United States Government had been appealed to, for purpose of keeping the works in operation, even against the good health and comfort of 100,000 Staten Island residents, but absolutely declined to step in. Garbage disposal in these three boroughs is still chaotic. Staten Island (Richmond borough) has continued to handle its own garbage and wastes successfully by incineration, and Queens borough in part.

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PUBLIC OWNERSHIP, PUBLIC CONTROL, OR WHAT?

Relations between nations are not the only ones that seem certain to be changed as a result of the world war. Most people expect to see those between labor and capital undergo a more or less radical change, with labor having a voice in the control of industry and receiving a greater share of the profits.

Not so much popular attention, however, has been drawn to the changes that seem impending in the relations between public service corporations and the public as represented by city, state and federal governments. The increase of street railway fares and gas and electric lighting rates in numerous localities, and the assertion in some states and denial in others by the public service commissions of their power to alter rates fixed by franchise or by city authorities under the terms of franchises, are both causes and symptoms of the changes that seem to be impending.

The users, on the one hand, are objecting to the increased rates and, in many cases, to the poorer service experienced during the past year. The companies complain that, unless they can increase their incomes, financial ruin is certain; and even where they have been permitted to increase rates, they claim in many cases that reduction in volume of business resulting from increased rates prevents their profiting sufficiently to avert bankruptcy. Then, too, labor is being supported by federal and state boards in its demands for higher wages, or where not so supported is otherwise making itself a thorn in the flesh for the companies.

Altogether, to many of the managers and officials of public service enterprises the future has by no means a rosy look; and, as stated in these columns a few weeks ago, many of them favor turning such enterprises over to the public.

There is the other side, of course—a side which chiefly is responsible for the failure of the public to entertain much sympathy for the companies. In few if any cases can it be said that the income will not meet operating expenses, but the deficiency is in the ability to pay interest on bonds and dividends on preferred and common stock; and the public have good reason for suspecting that in many if not the majority of cases a large part of the stock is water, or that stocks and bonds represent purchase of competing lines or other property that is unnecessary for the service rendered.

The final outcome is far from certain. It is even uncertain what solution would be best for the companies, what best for the public, or what best for all concerned. Shall the public take over the lines? Many cities contemplate doing so and one state has recently passed a law authorizing two or more cities to combine in the ownership and operation of interurban street railways.

Or shall the cities and states refrain from public ownership, but exert more comprehensive control of the private owners? This is now more generally favored by the public (where the public service commissions are not believed to have come under the control of the corporations), but a point has apparently been reached where a change must be made, if not in the fundamental principles of control at least in the manner of applying such principles.

The vital necessity is to keep the utilities operating and to secure a high grade of service to the public. If or where it is really the case that such service can not be given under existing conditions, then conditions must be changed in some way. What form such change shall take in each case is one of the most important questions to be solved by our city and state administrators during the next year or two of post-war reconstruction.

OUR DUTY TO THE RETURNING SOLDIERS—AND OURSELVES.

The war has wrought tremendous and far-reaching changes in American character and American thought. It has been a great awakener to duty; not alone to the great outstanding duties of raising billions for the Allies, of creating an army out of nothing, of depriving ourselves of food so that Europe might not starve. These were big duties, unselfishly performed.

With the coming of peace there has come, too, a realization of the smaller, but none the less important, duties we owe ourselves. One of the greatest of these is being pointed out by the United States Public Health Service, and backed up by the Secretary of the Treasury, the Secretaries of War and the Navy. It is the duty of clearing the nation from vice diseases, which war demonstrated to us all were the prime causes of inefficiency within the nation.

Before the war it would hardly have been possible for the newspapers to discuss such a theme as venereal disease; the narrow, short-sighted view was that such a subject was shocking, immodest, disgusting, not fit to be discussed. The result has been that ignorance of the extent to which these venereal diseases were menacing the nation has allowed them to thrive and multiply until, when, for the first time in our history, millions of our young men were forced to submit to expert medical examination, the percentage of men found to be infected with one or the other of these diseases was appalling.

Of the first million, 30,000 had a venereal disease, when they reported from camp. The percentage by states varied from 0.59 per cent of the boys from Oregon to 8.90 per cent of those from Florida. It was estimated that five-sixths of all the venereal disease in the army was brought there from civil life.

Such revelations as this add terrific poignancy to President Wilson's grave note of warning:

"It is not an army we have to make fit; it is a nation."

To know the truth about communicable diseases is to be able to guard against them; to lessen them; to control them. That has proved to be true of tuberculosis,

of measles, of smallpox; of all the communicable diseases.

So we must all come to realize that the venereal diseases are highly communicable. They are primarily diseases of vice, spread mainly through prostitution, but they are also communicable by innocent means.

The United States Public Health Service, under Surgeon General Rupert Blue, is making a nation-wide fight for the cleanliness of American communities. Prostitution is being suppressed; laws requiring the reporting of venereal diseases, just as other communicable diseases are reported, are being passed by many states. Clinics for the skilled treatment of venereal diseases are being established.

In this work, which has for its object a clean America, every citizen must help in his single strength. The false modesty which has prevented a free discussion of this menace to the nation must be brushed aside, so that everyone may know and realize the danger to be fought against.

Never again can we as individual citizens be content with an attitude of indifference toward such a subject as this. The war has opened our eyes; we must keep them open until the danger is past.

WATERWORKS OPERATION: RESERVOIR MAINTENANCE

Investigating Leakage from Reservoirs—Causes of Leakage—Locating Leaks—Stopping Leaks by Use of Cement, Asphalt, Clay, Etc.

Water may be lost from a reservoir through both evaporation and leakage. This loss is objectionable in that it diminishes the amount of water available; but leakage may be a serious matter in that it may increase and result in the final destruction of or serious damage to the reservoir. A certain amount of evaporation is unavoidable except by completely roofing over a reservoir, and this is financially practicable for small reservoirs only. There are few if any reservoirs from which there is not at least a small amount of loss by leakage or seepage, and in some cases this loss through the floor or containing basin of the reservoir is very considerable.

INVESTIGATING LEAKAGE.

The existence of an appreciable amount of leakage is generally learned in one of two ways, either by observing the escape of the water from the ground outside of the reservoir or below the dam, or by noting that the surface of the water, with all outlets closed perfectly tight, falls more rapidly than can be accounted for by evaporation. Every superintendent should use both of these methods to determine whether any leakage exists, especially during the first year or two after a reservoir is put into service. Reservoirs have been known to suffer considerable damage from leakage several years after they were constructed, but it is believed that a certain amount of leakage existed from the beginning, and gradually increased until the final catastrophe.

For studying the falling of the water surface, it is necessary to choose a time, if such can be found, when it will be possible to entirely close the inlet and outlet valves during a period of at least 24 hours. If the reservoir is a distributing reservoir, it may be possible to keep up the pressure by operating the pumps continuously; or to by-pass the reservoir if the supply comes by gravity from a higher source, using a pressure regulator to prevent too high pressure in the distribution system, if this should be neccessary. If this is not practicable, a meter capable of measuring the entire consumption of the city should be placed on the outlet of the reservoir. It should be tested for precision just before such use, and even then there is a possibility of an error of one or two per cent. By making the investigation for leakage during the winter time, when the surface of the reservoir is entirely covered with ice, the factor of evaporation may be practically eliminated.

With the outlet and inlet valves closed tight (they should be carefully examined to determine that no water passes through them), falling of the reservoir surface should be noted carefully by use of a hook gauge, which may be located in the gate house or other convenient point. In the case especially of a large reservoir, the investigation may be complicated by the entrance into the reservoir of the discharge from springs either above or below the water surface. The existence of such springs is generally known to the observant superintendent; the presence of those below the surface, except where the water is quite deep, being generally indicated when ice first forms in winter by the failure of the ice to freeze immediately above such submerged springs as quickly as it does at other points in the vicinity. When the reservoir continues to discharge through a meter on the outlet line, the difference between the measured discharge and the amount that has left the reservoir as calculated from the fall in reservoir surface, is loss by leakage and evaporation.

For determining the amount of loss by evaporation, an evaporation pan is believed to be the most reliable appliance to use. This consists of a box of wood lined with tin or other metal to make it waterproof, which is anchored to float near the middle of the reservoir, and which is filled with water until it settles as deep as may be without the risk of water being splashed into it from outside. Either a small hook gauge or a flat scale graduated to sixteenths of an inch or finer, set at an angle of say 30° with the horizontal, is attached inside the pan for reading the amount by which the surface falls due to evaporation. It is believed that the amount of evaporation from such a pan is practically the same as that from the reservoir in which it floats.

Even more definite information concerning leakage can often be obtained by careful inspection of the vicinity around or below the reservoir (embracing all points lower than the surface of the water in the reservoir), for the emergence of water that is escaping from the reservoir. This is especially important in that such springs indicate either large amounts of leakage or leakage concentrated in definite channels, either of which is much more threatening to the safety of the dam than a general seepage and exuding of the water. While the reservoir is being filled for the first time (which filling should be done slowly, occupying several days for a small reservoir and several weeks for a large one), careful inspection should be made of all points where leakage of the reservoir water could possibly have an outlet; and at the first appearance of leakage investigation should be made, the inflow of water being stopped temporarily if conditions appear to be serious.

On the appearance of such leakage, careful inspection should be made to determine some of the conditions under which it is taking place. A small basin should be dug around the leakage outlet (or built around it if it should be of rock) in which the escaping water may collect to sufficient depth to permit obtaining samples without stirring up deposits in the bottom. After the flow into and out of this small basin has become established, it should be noted whether the water as it emerges carries any suspended matter, and the nature of this matter should be determined by carefully collecting a sample in a large size test-tube, a clear glass, etc. If

the water runs perfectly clear, there is apparently no removal of earthy matter by the escaping water, and the leak is not enlarging. It is possible that the water is dissolving lime from limestone formation under the dam or in its masonry, or dissolving mortar in the masonry, and this can generally be determined by a careful comparison of the chemical analyses of the escaping water and of that in the reservoir.

A careful investigation should have been made of the land below the reservoir to note the existence of springs prior to the filling of the reservoir, and the chemical composition of the water from any such springs should be determined, as well as the quantity of discharge. If the quantity or quality of the water discharged by such springs after filling the reservoir differs from that prior to such filling, the reason should be investigated.

All springs or leakage outlets should be watched carefully and observation made of them at frequent intervals for several months after the reservoir is put into service. If the quantity does not increase and there is no indication of the removal of either earthy matter or mineral matter, the desirability of finding and stopping the leakage would seem to rest chiefly upon the advantages of conserving the supply.

The escaping water may travel through crevices in the rock lying under the dam or at its ends, or through joints in the masonry in case of a masonry dam, or by seepage through an earthen embankment, or by seepage under such embankment through the natural soil. Which it is in any given case can generally be determined quite readily by the known conditions as to geological conditions and the construction and nature of the dam.

LOCATING LEAKS.

The stopping of leakage is generally a most difficult matter, and the exact method to be employed will differ in almost every case. There are certain general principles, however, which can be suggested and certain details of procedure that may be of service.

It is first necessary to locate the point at which the water escapes from the reservoir. (There is probably no conceivable condition under which reservoir leakage can be stopped at its lower or outlet end.) Since the point of escape of the water is always beneath the water of the reservoir, the escape of the water cannot be observed directly except possibly by use of a diver. In the case of a masonry dam, the leakage will generally be either in one of a number of faulty joints or cracks that may appear in the back, or through a large number of joints that are more or less porous and show no visible cracks. In the case of a concrete dam it may be through the concrete generally. It is practicable at comparatively small expense to render exposed masonry surfaces water-tight, and it will generally be cheaper and more satisfactory to waterproof all suspected places than to endeavor to locate the exact areas at fault. If the leakage is found escaping under or below the toe of the dam, it probably is taking place through the rock or other material on which the dam rests. The exact point of escape, in such case, can sometimes be determined by spreading a thin layer of clay or other fine-grain soil over the exposed rock at the bottom of the reservoir, then filling the reservoir very slowly so as not to disturb this layer (or the layer may be formed without emptying the reservoir, by throwing earth into it from boats); then drawing the water down until it stands only two or three feet deep over the suspected rock bottom, and when it is clear, looking for indications in the thin clay cover of leakage into the rock, which leakage will have carried with it the clay immediately above and around the opening.

If the bottom of the reservoir is covered with gravel or sand, or other porous material, the probability is that seepage takes place through large areas of this material and the location of such areas is extremely difficult unless the leakage is large.

Where there is a considerable amount of leakage concentrated at one or more points, these may sometimes be located by the following method: A long tube, such as a rain-water leader or fire hose, of a length a little less than the depth of the water, is provided at top with a funnel and is attached to the side of a large boat or scow which is used to carry clay or similar fine-grain material. The scow is moved slowly over the suspected area and clay is meantime shoveled into the funnel and discharged at the bottom of the reservoir. An observer follows behind the scow and examines the bottom, using a water telescope if necessary (this is a tube the lower end of which is kept below the surface of the water and the upper end closed except for a small opening through which the observer looks, the tube eliminating the reflected light which interferes with looking into the water). At any point where water is escaping in any volume, the fine clay will be carried with it and the water will clear itself much more rapidly than at points where such clearing must depend upon the natural sedimentation of the clay. Any appreciable leakage through crevices in the more or less vertical faces of the rock around the sides of the reservoir can frequently be located in the same way.

While clay is being applied in the manner just described, inspection should be continued of the outlets of the leakage, if such are known, and the exact time of appearance of suspended matter in the leakage water should be made known, since it indicates that the clay deposited has passed under or through the dam. Allowance being made for the length of time probably required for water to pass under or through the dam, it is probable that the leakage is occurring at the point where clay was being discharged at such interval of time prior to the appearance of sediment in the outflow. This suggests another method of locating leakage, namely that of discharging through a tube, at points near the bottom of the reservoir or the back of the dam, water highly colored with aniline dyes, and noting the time of appearance of such color in the water escaping below the dam.

STOPPING LEAKAGE.

For stopping leakage in masonry or through seamy or porous rock, reliance should never be placed upon clay in any form. The writer knows numerous instances where carefully planned efforts have been made to use clay for this purpose, but has yet to learn of one that was successful.

If the crack or opening is at all large, it should be filled with Portland cement mortar. After the mortar has set it may then be made more water-tight by washing it with cement and water of creamy consistency, the mortar and surrounding rock first being thoroughly wet. After this wash has dried and the cement set, it should be wet again and a second wash of cream of cement applied. This treatment over the entire wetted face of a masonry dam, especially a concrete dam, will generally add to its tightness. In fact, if well done, it will generally make any masonry dam as nearly tight as a dam can be; except that temperature expansion and contraction may open up cracks in the face.

Where temperature cracks occur, greater tightness can generally be obtained by covering the entire surface with a layer of asphalt made liquid by heat, applied when the masonry itself is warm, either by carrying on the work only after several hours of summer sunshine have

warmed it, or after it has been heated by the application of a blow-torch or some similar contrivance. In using a blow-torch, however, care must be taken not to overheat the rock so as to cause it to flake off or otherwise disintegrate at the surface. (Such treatment of a reservoir wall in St. Louis with three coats of asphalt was done by contract at a cost of 3.74 cents per square foot.) Where the cracks through which leakage occurs are in the rock in the sides or bottom of the reservoir, there can be no expansion or contraction, and the use of mortar and cement wash will generally be effective.

Water escaping through an embankment may pass as a general seepage, or it may be concentrated in one or more channels. In the latter case the leakage is generally due to the existence of sticks or other foreign matters in the soil, to holes bored by muskrats, crayfish or other water animals; or the channel may follow the outside of a pipe or other body that extends continuously through the embankment. Most earth dams have been constructed with a core wall calculated to prevent water escaping through the dam, even though it may enter the upper face of it, and such wall will generally serve to limit the burrowing of animals.

Where there is no core wall, and there is general seepage, it may be necessary to line the entire upper face of the dam with some waterproofing material. Clay puddle may be used for this purpose, but preference in recent years has been for concrete. With a thoroughly compacted or settled bank, the face being dressed down to a uniform surface from which all soil that is water-soaken or otherwise soft has been removed, a four-inch thickness of concrete will generally suffice for a waterproof lining. It is not necessary to describe the construction of such lining, except to say that all the precautions necessary for securing waterproof concrete should be taken; that the concrete should be anchored at the bottom by a sufficiently strong toe wall or other structure to prevent its sliding down the bank; and that in most cases it is desirable to use expansion joints running at intervals up the slope, but horizontal joints are not necessary.

Where the seepage occurs generally over a porous bottom, the remedy is much more difficult. If the area is small, concrete is probably the best remedy; but for large areas it would possibly be impracticably expensive. Clay or other fine-grain soil may be used for preventing seepage. This can frequently be applied by casting it at a uniform rate from a scow drawn slowly back and forth across the reservoir. It may require two, three or more applications to secure tightness in this way. If the first application, for instance, practically stops the seepage over two-thirds of the area, small areas here and there not receiving sufficient clay, the rate of seepage through these small areas will become greater, and on the second application of clay there will be slight currents which will tend to draw the clay to the desired points rather than permit it to settle over areas already sufficiently covered. This method is expensive for a large reservoir, and, instead, it may be possible to secure the result by casting or sluicing clay or other fine earth into the stream or streams feeding the reservoir, especially if this is done when water is flowing over the dam or the waste weir so that there is a current entirely across the reservoir to carry the clay to all parts of it. It is difficult, however, to secure a general distribution of the clay by this method.

Where the bottom of the reservoir is not already of material at least as fine as rather fine sand, this method will probably prove disappointing, since the clay will be carried into and through the pores of the soil. In such case it may be desirable to build up a bed for retaining the clay, sand being perhaps the best material to use for this purpose. The sand should be spread over the entire area with a minimum thickness of at least an eighth of an inch, and the clay may then be applied as before described. In fact, if the water naturally carries clay after rain storms, the application of the sand alone may be sufficient, the clay naturally provided by storm run-offs in time filling up the pores in the sand layer.

In one case of a large reservoir, a large part of the bottom of which was of quite porous material, it was proposed to cover such material with a thin layer of sheet asphalt mixture, laid and rolled as is done in paving highways. This would probably require a more or less rough grading so as to remove bumps and hollows, and rolling with a heavy roller so as to furnish a stable support for the asphalt lining. So far as we know this method of preventing leakage has never been carried out.

Where it is impracticable to adopt any method for making the bottom of the reservoir impervious, the amount of water escaping may be greatly diminished and danger of rupture eliminated by filling above the dam so as to give it a long, flat slope, thus increasing the distance through which the water at the greater depths must travel in order to escape below the dam. This may or may not be more expensive than methods described above, depending upon local conditions. It may be possible to supply the earth backing by hydraulicking the earth into the reservoir from the higher lands at the end of the dam.

Another method of preventing seepage through the ground under the dam is by means of a cut-off wall of sheet piling, concrete or clay puddle. If there is rock within ten or fifteen feet below the reservoir bottom, a concrete all built on such rock and thoroughly bonded to it will prevent such seepage. If there is clay or other impervious material within thirty or forty feet depth, a cut-off wall of tongued-and-grooved sheet piling driven into such impervious stratum will serve the purpose. In any case, the cut-off wall should be placed close to the upper toe of the dam and the face of the dam below the cut-off wall made impervious by the use of clay or concrete as described above.

In general, it may be said that only cement or washes of asphalt, alum or other special waterproofing materials can be used in connection with masonry or rock. Clay can be used for waterproofing soil, but only when applied to that whose pores are very fine. Where the soil is gravelly or composed of coarse grains of any nature, clay is worthless. In such cases a mixture of clay and sand also is of little permanent value; sand alone is much better for use than clay, for although it may not make so tight a dam, it is less likely to be removed by the escaping water. The only plan that is likely to give permanent results with very porous soil is to apply over the gravel or over the coarse-grain material a fine gravel or coarse sand that cannot be carried into the interstices of the coarser material; then, on top of this, place a layer of finer material which cannot pass through the interstices of that last applied, and so on, finally applying a layer of fine sand. If this is all thoroughly rolled or otherwise compacted (it may be applied to advantage while there is a foot or two of water in the reservoir, thus securing both a natural segregation of particle and "water-tamping" which results in a compact mass), clay may then be applied to complete the waterproofing; or, as suggested above, it may be left to nature to supply the fine material during successful freshets unless the stream supplying the reservoir remains clear at all times.

(To be continued)

The WEEK'S NEWS

Oregon's Proposed Highway Expenditures—Denver's City-Owned Waterworks—Complete Metering for Newport, R. I.—Ontario Hydro-Electric Commission—New York Has Aerial Police Force—U. S. Helps in Cleaning Up Vice—Capital Issues Committee Suspends Work—"Single Tax" Defeated in California—Buffalo to Decide Again on Higher Fares—Senate Refuses Aid for Hudson Tunnel—Government Housing Work to Stop—Bad Housing in Philadelphia.

ROADS AND PAVEMENTS

City Must Pay for Streets Without Special Benefit.

Philadelphia, Pa.—The city must pay for paving streets where it is shown the improvement is for the general good and no special benefit is derived by the owners of abutting property, according to a decision filed by Judge Wessel in the Common Pleas Court. The case was that of the city, to the use of the McNichol Paving and Construction Company, against two owners of large tracts of farm land, which were included in the several ordinances of councils and the contracts between the city and the different railroads providing for the port development, abolition of grade crossings and the general improvements in South Philadelphia. In this particular case the city and railroads must assume the expense of paving this newly opened section. The city had filed liens against the land owned by the defendants for work and material furnished in paving the streets through the land, amounting in the aggregate to $3,453.06. In resisting payment it was contended the work was a public improvement for the good of the general public and there was no special benefit to the properties. Judge Wessel upholds this contention and says, in part:

> In the present case an examination of the facts, in which the per-foot frontage rule is based, discloses at once the want of analogy between large farms with single occupants or owners, or wild or untenanted land in the country, and the small lots of a crowded street in a populous town. The legislature, therefore, made a mistake in fixing such a burden upon the lands along the route of this avenue. It is, in fact, nothing more than a law to coerce certain land owners to pay for a public improvement in which their interest is no greater, and as to some of them not so great, as that of many others who pay nothing; and it offends against the clear intent and spirit of the bill of rights. We, therefore, conclude that if the defendants can satisfy the jury that the paving was merely a part of a general plan of improvement for the public good and resulted in no special benefit to the defendants' property, they should not be made to pay any part of the amount involved in this lien. This renders unnecessary the consideration, at this time, of the second question raised by the affidavit of defense. The rule for judgment for want of a sufficient affidavit of defense is discharged.

Road Renamed for Pershing.

Jefferson City, Mo.—In order to show its pride in the fact that General John J. Pershing is a Missourian, the section of the "Pike's Peak—Ocean-to-Ocean Highway" passing through the state has been rechristened "Pershing's Transport Route." The road passes by the old Pershing home at Laclede, Mo. Both as a "reconstruction" measure, to furnish jobs for returning Missouri soldiers who may want them, and as a state memorial to the commander of the American forces in France, plans are under way for the early hard surfacing and reconstruction of this highway.

To Spend $3,525,200 for Oregon Roads.

Salem, Ore.—Highway construction calling for an expenditure totaling $3,525,200 is contemplated in the annual road program adopted by the state highway commission, and it is estimated that it will furnish employment to more than three thousand men this year. Contracts will probably be awarded for several of the projects at the January meeting of the commission, but the bulk of them will be awarded later in the year. The funds for the construction of the projects embraced in the program will come from the $6,000,000 hard-surfacing fund, the quarter mill tax fund and the automobile fund. Approximately $2,790,200 will come from the first named fund, it is estimated, and the remainder, $735,000, from the other two. Projects to be constructed with funds from the federal forest and post road funds are not included in the program. Plans for the expenditure of this money will be formulated in the near future by the commission. The Aurora-Salem project will be built with such funds, and the commission has decided to commence construction work upon it as soon as the weather will permit. The highway engineer has been instructed to immediately advertise for bids for the construction of the Hood River-Mosier section of the Columbia river highway, and the contract for it will no doubt be awarded at the next meeting of the commission. Fully one year will be required to build this link, and it will provide employment for several hundred men.

WATER SUPPLY

City Increases Water Rates.

Middletown, O.—The city commission has passed an ordinance increasing the water rates. The new rates will be as follows: $1.35 per cubic foot for from 1,000 to 5,000; $1.10 per cubic foot for from 5,000 to 10,000; 70c per cubic foot for all over 10,000 cubic feet. A discount of 10 per cent will be allowed for all bills paid before the 20th of the month. The water works records show the consumers may be divided as follows: Those using 1,000 cubic feet, 1,406; 2,000 cubic feet, 624; 3,000 cubic feet, 377; 4,000 cubic feet, 184; 5,000 cubic feet, 82; 6,000 cubic feet, 63; 7,000 cubic feet, 39; 8,000 cubic feet, 32; 9,000 cubic feet, 13, and over 10,000 cubic feet, 159. During the last quarter, under the old rates, receipts amounted to $34,239, while under the new rate for this same period the receipts would have amounted to $48,231, an increase of $13,992.

Denver's Waterworks Under City Ownership.

Denver, Colo.—The city has now been in actual possession of its municipal water plant for two months, the formal transfer having taken place on November 1. The total amount paid for the plant was $13,922,836.60, or $47,163.40 less than the amount voted by the people. From November 1 to November 16, the water commission took in $168,633.52 on the first half of water rents for the ensuing year. Several important changes have occurred in connection with the plant since the city took it over. The water board submitted its plan for 1919 extensions to the Denver County Council of Defense, which approved them and forwarded its recommendations to the capital issues committee at Washington. These plans include extension of the plant to accommodate the General Army Hospital No. 21 at Aurora and the Union Stock Yards district, the rapid expansion of which demands greater fire protection. These extensions, both of which, it is estimated, can be constructed for $619,000, will also serve to increase service to the general consumer, according to Barton Lowther, chief engineer and superintendent. The city coal department, on November 1, took over the work of supplying the water plant's seven pumping stations with coal. The Denver Union Water company paid $5 a ton for coal used at these plants, but the municipal coal department will furnish the coal, the estimated amount of which is 10,000 tons annually at $3.15 per ton. These are, of course, war prices.

The total tonnage furnished by the coal department to city institutions during the year ending September 1 was 10,583. The acquisition of the water plant will, therefore, double the total volume of coal used by the city and, without considering domestic consumption at all, will make the continuation of the city coal department as a permanent institution a desirable feature of city government. The personnel of the water plant's operating force was not disturbed, except as to a few persons in managerial capacity, the water commission recognizing that the successful operation of the plant requires skilled help. The city is exchanging municipal water bonds at four and one-half per cent for bonds of the South Platte Reservoir and Irrigation company at five per cent, the total amounting to $3,112,000. These bonds will not be retired, as they have a certain voting power and the city attorney's office has deemed it advisable to continue the various boards and directorships of the old company for legal reasons. City officials succeeded water company officials on all these boards. The financial statement, upon which was determined the amount of bonds delivered to the Denver Union Water company, is as follows:

Master's valuation	$13,415,899.00
Additions and betterments	1,045,462.80
	$14,461,361.80
Deduct depreciation (4½ years at $140,000 a year)	$ 630,000.00
	$13,831,361.80
Deduct outstanding South Platte bonds	3,112,000.00
	$10,719,361.80
Add difference between appraiser's valuation of Class T property, viz., $266,160.80, and Master's report of $174,686, amounting to	91,474.80
	$10,810,836.60

Commission Orders Complete Metering.

Newport, R. I.—The state public utilities commission has handed down a decision directing the Newport Water Works to proceed "as soon as possible" to meter all city service pipes in Newport. The commission also directs the company, within four months after the meter installation is complete, to file with it for allowance a new schedule of rates, designed to produce net revenue substantially equal to that received at present. Decision by the commission comes upon the complaints of the city of Newport and of consumers against the Newport Water Works, hearing upon which began in August, 1913, and ended in January, 1915. The decision says that the company must submit "a new schedule of hydrant, fixture and meter rates, and special rates, so adjusted as to produce a net revenue substantially equal to that received by the company under the present schedule of rates. Such new schedule shall provide that meters may be installed at the request of either the customer or the company, and that the company shall bear the expense of the meters. Such new schedule may provide that the company shall be required to recognize as a customer only the owner of the land, or the lessee of the entire premises, also that all fixture rates and a minimum charge for metered service shall be payable annually in advance."

STREET LIGHTING AND POWER

Work of Canadian Provincial Hydro-Electric Commission.

Toronto, Ont.—E. R. C. Clarkson, who was appointed by the Ontario Government to investigate the operations of the Provincial Hydro-Electric Commission has submitted a report up to October, 1917, in which he clearly vindicates the commission and justifies public ownership of public utilities, when controlled by such men as Sir Adam Beck and his colleagues. Referring to the Niagara power system Mr. Clarkson says: "To October 31, 1917, the rates collected by the commission from forty-one municipalities had been sufficient not only to meet operating cost and reserves for renewals, contingencies and sinking fund, but to leave a surplus of $391,551.94. This amount has been retained by the commission either as security for the payment of sinking fund charges or with a view to moderation in the rates charged to the municipalities which contributed. The rates collected from the remaining sixty-eight municipalities were insufficient by $204,822.14 to pay operating expenses, and also meet the reserves for renewals and contingencies in respect of the proportion of capital cost of works and lines to be operated by them."

New Power Plant for Scotch City.

Glasgow, Scotland.—The increased use of electricity for power and heating has made it necessary for the corporation of the city of Glasgow to build an additional electrical power plant. This new plant is located at Dalmarnock, Scotland, and covers 45 acres on the right bank of the River Clyde. The site was purchased for $315,000. In August, 1914, offers were accepted for constructing the inlet and outlet water culverts and the foundations, and this work, which cost $403,919, was finished at the end of 1916. It had been agreed to suspend further operations during the war, but owing to the great increase in the demand for electric power for work of national importance this decision was rescinded. In the summer of 1916 contracts to a total amount of $583,980 were fixed for reinforced concrete buildings and brick and mason work, constituting one-half of the generating station, one-half of the switch house, two boiler houses, and complete coal storage. Since April, 1917, orders have been placed for four 25,000 horsepower turbo-alternators and condensing plant, together with eight boilers and accessories necessary for the complete equipment of one boiler house, also for a plant for the rapid and economical handling of an amount of coal amply sufficient for the maximum requirements of the station. There are railway sidings for the delivery of the coal, and the store, which covers 2½ acres, will accommodate 60,000 tons of coal. The turbine room, a two-story structure 230 feet long by 75 feet wide, is the main building. On the north side will be two boiler houses, three stories in height, each containing eight boilers. On the south side of the turbine room the switch house is being erected, and it will contain the main switch gear, as well as 20,000-volt transformers. The switch house, being a separate building, the staff will perform their duties undisturbed by the noise of rotating machinery. There will be a workshop alongside the first boiler house, and there a crane for lifting heavy machinery will run from over the railway and connect with the turbine room crane. The machinery and accessories on order for the turbine room, boiler and switch houses, etc., will cost $4,185,190.

FIRE AND POLICE

No Increased Pay for "Inactive" Sergeants.

Yonkers, N. Y.—Only the patrolmen in the police bureau, and the firemen of the three grades will receive the $150 annual increase in salary, which has been provided for in the budget of the public safety department, approved by the board of estimate. Delegations of both police and firemen had waited upon commissioner O'Keefe, and asked that their salaries be increased at least $250 a year. That, however, was before the armistice, when it appeared as though the demands of the uniformed men would have to be granted in order to keep them from resigning, to go into more profitable war-industry occupations. The estimate board discussed the probability that the cost of living might be reduced sufficiently to enable the men to live comfortably on their salaries. They finally decided on the $150 increase. It was originally intended to include the police sergeants in the pay increase, but during the discussion among the members of the board of estimate, the point was brought out that not in six years has a sergeant "turned in" a patrolman for even the most trivial infraction of rules. From this the board took the attitude that the sergeants

could not have displayed any extraordinary vigilance in making their rounds, and that therefore they were not entitled to much consideration in taking up the question of salaries. The sergeants receive $1,650 a year, and the patrolman $1,400. The average pay of the ordinary fireman is $1,300

Fire Sweeps Business District.

Burlington, N. C.—Damage estimated at $250,000 resulted from fire in the business district here which destroyed three concerns and partly burned the buildings and stocks of several others. The Greensboro fire department responded to a call for assistance, but almost the entire business block was consumed before it arrived. The Greenboro fire engine, on it way to Burlington, turned over on the road at Elon College. Other apparatus was forwarded by railroad. However, the water pressure at Burlington was exhausted and sufficient water was not available to throw a stream to the top of the burning buildings. Without an engine it was impossible to stop the spread of the flames. The fire started in the center of the block on Main street, and spread east and west. One fifty thousand-gallon tank and a small pump was all the fighting apparatus available.

Aerial Police for New York City.

New York, N. Y.—Police commissioner Enright has organized an aviation section in the police department with Colonel Jefferson De Mont Thompson as its head. New York is said to be the first city in the world to have a regular aviation section connected with its police department. Alan R. Hawley, president of the Aero Club of America, in speaking of the new section, said: "The fundamental importance of the aviation section is quickly appreciated when the many duties of the police department are considered. The work of the aviators in connection with directing the protection of communities surrounding Morgan, N. J., during the recent catastrophe, when the fire threatened to ignite tons of TNT, which might have caused the destruction of the subways and buildings in New York City, emphasized the necessity of having aviators available for such emergencies."

Wiping Out the "Red Light" Districts.

Washington, D. C.—The report of the Law Enforcement Division of the Commission on Training Camp Activities for the week ending November 27 gives a good indication of the progress that is being made throughout the nation in combating the spread of venereal diseases and the suppression of prostitution. In Chester, Pa., a raid resulted in the arrest of 42 men and women and the closing of a number of resorts. In Denver the chief of police has ordered all the known prostitutes listed. In Lafayette, La., the "red light" district was raided and closed. McLaurin, Miss., made a raid on resorts and arrested two women. In Oklahoma City, Okla., a force of volunteer police has been organized to look after the hotels and rooming houses. In San Francisco during the influenza epidemic keepers of houses of ill repute attempted to re-open; raids resulted in the arrest of 34 women and 8 men. In Waco, Tex., a raid on a number of hotels caused the arrest and detention of 20 men and women. During the week two "red light" districts were closed, one each in Opelousas and Lafayette, La. Seven houses of prostitution were closed, four in New Orleans and three in Providence, R. I. There were 421 arrests for prostitution, of which Reading, Pa., furnished the highest number, 108; Chester, Pa., was second with 42.

GOVERNMENT AND FINANCE

Capital Issues Committee Suspend Work.

Washington, D. C.—The Capital Issues Committee, the Government' war agency for the suppression of unessential security issues, suspended its activities December 31 and will remain inactive until dissolved, unless called back into service by developments. Accompanying the announcement were warnings to the public, both from the committee and secretary Glass, of the necessity for continued strict economy and against worthless securities. The committee stated its intention of making a supplementary report to Congress recommending a law to prevent impositions upon the investing public, and secretary Glass said he would ask the present Congress to enact such legislation immediately. To illustrate the extent of the menace, the committee said schools were being established to drill salesmen in the art of fraudulent promotion. Secretary Glass issued a statement as follows: "The demand of the Capital Issues Committee to suspend its activities December 31 should not be interpreted by the business public as a warrant for any expenditure of capital for needless or unwise purposes, whether public or private in their nature. Should it become apparent that voluntary restraints are not being exercised so as to prevent the misuse of capital I shall request the committee to resume its control. My chief misgiving in accepting the action of the committee arises out of the need the committee has frequently expressed and the importance which had become increasingly obvious, of protecting the public investor against the flood of worthless or doubtful securities which threaten the market when the restrictions are removed, and present conditions emphasize the importance of obtaining emergency legislation as speedily as possible so as to be able to cope effectively with this evil. The government not only should protect itself as to future bond issues but, as well, owes a duty to the millions of Liberty Bond buyers to restrain reckless and fraudulent promoters, particularly at this time. I intend to ask Congress immediately for legislation that will check the traffic in worthless securities while imposing no undue restrictions upon the financing of legitimate business, and shall urge that it be made effective before the close of the present session. Meantime, it may become necessary before such legislation is passed to reassemble the committee for the purpose of resuming its functions." Chairman Hamlin, in a statement, pointed out that it is "imperative that capital should be saved and removal of the restraining influence exerted by the committee during its existence should not be construed as approval of the financing of unnecessary public projects or private enterprises of doubtful merit. On the contrary, the financial needs of the Government and the large capital requirements of the railroads and for the readjustment of American industries to a peace basis compel strict economy in the use of new capital."

Reconstruction Committee Appointed.

St. Louis, Mo.—Mayor Henry W. Kiel has created a Municipal Reconstruction Committee which will act in an advisory capacity to the municipal administration in the solution of after-the-war problems. Clarence H. Howard, president Commonwealth Steel Co., has been appointed to the committee.

Single Tax Plan Defeated.

Sacramento, Cal.—The proposed "single tax" amendment submitted at the recent elections was defeated throughout the state by a total vote of 360,334 to 118,088. The 1916 vote on the same question stood 576,533 to 260,332. "After spending over $100,000 on this election," figured the real estate interests, "the single tax strength sank from one in two to one in three."

Secretary Baker Asks Hastened Construction Work.

Washington, D. C.—Government officials are inaugurating a campaign to have states, counties, and municipalities begin all possible construction work at once in order to furnish work for returned soldiers and sailors, as the United States Employment Service and labor representatives in the War Industries Board expect a surplus of labor and a shortage of jobs during the late winter. Newton D. Baker, Secretary of War and chairman of the Council of National Defence, has wired all State Defence Councils as follows: "Reemployment of discharged soldiers, sailors, and war workers is one of the most important tasks now before the country. We strongly urge that, in sections where surplus labor exists, all public improve-

ments be advanced in order to absorb labor. We ask that you use all influence with state, county and municipal authorities to this end. Preliminary steps should be taken immediately in order that necessary authority may be secured in time, for operations upon opening of construction period." Washington officials will do everything possible to have legislatures of the various states provide funds for immediate public improvements, and to get private construction work under way. What is expected to result in immediate impetus for building work is the order sent out by Bernard M. Baruch from Washington, as follows: "Effective January 1, the rules, regulations and directions of every nature whatsoever issued by the priorities division of the War Industries Board are hereby canceled, and all pledges heretofore made on the suggestion or request of the said priorities division are hereby revoked.

Wants State to Regulate Haphazard Tax Collection.

Albany, N. Y.—A more stringent check on the collection of approximately $70,000,000 of revenue gathered annually by upwards of five thousand different state and local divisions and agencies is to be recommended to the Legislature by state controller Travis. In his arraignment of the present system, the controller insists that it is manifestly as much his duty to audit the revenues of the State as the expenditures because irregularities occur more frequently in the former than in the latter. "Many public officials who collect these revenues are neither business men nor accountants," said the comptroller. "This condition is disclosed particularly in the work of the municipal accounts bureau in charge of the auditing of the finances of over fifteen hundred municipalities of the state, and while numerous cases of shortages have been discovered, it is only just to say that the most of them have been the result of carelessness and ignorance of the proper laws and of accounting methods, rather than from deliberate dishonesty."

Advisory Committee to Study State Economy.

Sacramento, Cal.—Thorough investigation of the business affairs of the state of California, with a view to a reduction in expenses if it can be done without impairment of service and efficiency, is contemplated by Governor William D. Stephens in a statement, in which he announces a committee to handle the details. The committee is composed of the following named: A. E. Boynton, president of the Commonwealth Club of San Francisco; Herbert W. Clark, director Taxpayers' Association; Frank P. Flint, former United States senator; Dr. John R. Haynes, Los Angeles; Percy V. Long, San Francisco; Lee A. Phillips, Los Angeles; U. S. Webb, attorney general; John S. Chambers, state controller; Marshall De Motte, Clyde A. Seavey and Edward A. Dickson, of the state board of control. The governor's statement says in part: "During the past few years California's government has been practically reconstructed. We have experienced a development along social, humanitarian and industrial lines which for so short a period surpasses the history of like achievement in any other state. But exactly the same results follow in governmental development as follows expansion in private business, and as in private business, after growth and development, we now must remove all extraneous expense and practice the strictest economy in carrying on the state's activities. If there be debris and structural staging, necessary to the work of building but unnecessary and expensive to proper maintenance, such non-essentials must now be removed. Necessarily in grappling with the big industrial, economic and social problems, governmental activities have grown up more or less independent of each other, with inevitable overlapping. What we want to know is the extent of this overlapping, and the possible saving to the people in cost of government without injury to the public service. With this idea in mind I am asking the committee to make a study of the problems and to report to the governor upon the following points: The statutes under which each department, bureau or commission is organized. The powers, duties and internal organizations, as provided by law and in fact exercised. To what extent powers and duties overlap and duplicate. Analysis and comparison of appropriations and expenditures. Recommendations."

TRAFFIC AND TRANSPORATION

Buffalo to Vote Again on Higher Fares.

Buffalo, N. Y.—The citizens must vote again on the question of paying a 6 or 7-cent fare to the International Railway, city council having re-enacted a previous resolution which allows the company to charge a 6-cent fare with 1-cent rebate slips until the determination of a just and reasonable rate by the Public Service Commission for the Second District. This action on the part of the council was made necessary by the filing of a referendum petition containing the names of more than 12,000 voters checked by the city clerk and representatives of the International Railway. March 25 has been fixed by the city council as the date for the next referendum. The question to be voted upon will be the same as before, namely, whether or not the action of the city council shall be repealed. By voting "yes" a voter opposes a higher rate of fare, and by voting "no" the vote favors the 6 or 7-cent fare. At the last referendum the vote was five to one against higher fares. Although an agreement was reached last month between the municipal authorities and representatives of the railway whereby all pending litigation would be dropped and the so-called service-at-cost plan into effect, no effort has been made by the council to enact a resolution toward accomplishing the plan. Such a resolution would also be subject to a referendum. No resolution can be enacted by the city council giving the railway the right to raise its fares, without a referendum vote of the people, if the proper referendum petitions are filed.

No U. S. Aid for Hudson Tunnel.

Washington, D. C.—Practically all hopes of obtaining federal aid for the proposed Hudson River vehicular tunnel from Jersey City to New York has been killed. After hearing the representatives of New Jersey and New York on the Calder bill, authorizing the Federal Government to participate in the cost, the Senate committee on interstate commerce voted against a favorable report on the bill. The committee's action was unanimous and was based on the conviction that the cost should be borne either by the two states or by private capital. There is a bill on the House side, introduced by Representative Eagan, similar in terms to the Calder bill. It is unlikely that in view of the Senate committee's action, it can be successfully pushed at this time. The friends of the bill in the Senate said that one of the factors which influenced the committee to act adversely was the agitation over Government ownership of utilities. It was declared that the state of mind at the Senate was unfavorable to anything that smacked of Government ownership. The Calder bill would authorize the National Government to join with New York and New Jersey in building the tunnel at a cost of $12,000,000. The star witness at the hearing was Major General George W. Goethals, who said he had passed on the engineering phases of the plan. In response to a query based on the issue whether the Federal Government should be made to pay any part of the improvement, General Goethals said that the tunnel would serve a distinct military value, and if it had been in existence during the emergency of the war period at the Port of New York, the Government could have expedited the handling of its transports. General Goethals also declared that the tunnel would expedite the handling of mails. The committee manifested its opposition to federal financing in numerous questions that were put to the representatives of the two states. General Goethals said that he had been called in to pass on the project by the Joint State Commission. He first passed on the question whether the two shores would be connected by bridge or tunnel. He decided against a bridge because it would be more or less an obstacle to navigation

and, if destroyed in time of war, would block navigation. A vehicular tunnel project would relieve congestion where a bridge would not, and fogs and ice would not be the terror to traffic that it now is. General Goethals said his plan provided for a tunnel forty-two feet in diameter, of concrete block construction, with two tiers, and of a width sufficient to allow three trucks to travel side by side and also providing a footpath. General Goethals said that a responsible contracting firm has estimated the cost, on the basis of wartime conditions, at $12,000,000, and that construction would take two years. The annual maintenance cost was placed at $125,000. "This tunnel," added the general, "will relieve congestion along the shore front and if the proposed port development with a large freight classification yard on the Jersey side is followed out it will bring material relief in lighterage and other river traffic that is now very much congested." It had been calculated, he said, that the cost would be paid back under an amortization plan within twenty years. E. W. Bloomingdale, chairman of the joint tunnel commission, in arguing for federal aid, justified it on the ground that the tunnel would be a continuation of the national highway system and an essential part of the federal mail routes. "You can say the same about a bridge over the Mississippi," said Senator Kellogg. "If we are to help with this project for the reason you state, why not help with the various other projects that are on the same level?" Mr. Bloomingdale proceeded to argue that the port of New York was more than a local affair; it is a national institution, surrounded by conditions of country-wide extent, that put it in a class by itself. Senator Kellogg retorted that the difference between New York and the cases he cited was a difference of degree only. Mr. Bloomingdale said that the federal road aid act, whereby the Federal Government contributed to state road upkeep in partnership with the states, furnished an anology which made the tunnel bill a reasonable proposition. The question of ownership also was brought up. It was explained that under the proposed plan, the ownership would rest with the two states and the Federal Government would possess perpetual rights for the movement of mails and for military purposes. Chairman Smith wanted to know if, when the cost was liquidated, the tunnel would be made a free public roadway. Mr. Bloomingdale was inclined to think it would. He cited the fact that the history of all toll roads and bridges shows that in due course they become free.

CITY PLANNING AND HOUSING

Senate Asks Stop to Government Housing.

Washington, D. C.—Suspension of work on all housing projects under construction for the Department of Labor's Housing Corporation, which are not 75 per cent completed, is provided for in a resolution adopted by the Senate. The resolution was agreed upon after Senator Lenroot of Wisconsin, a member of the Public Buildings and Lands Committee, which has been investigating the housing projects, charged in the Senate that testimony showed that a construction company of New York had made excessive profits on contracts and that contracts had been awarded by the corporation in violation of law. In addition to stopping work on projects in all parts of the country for housing war workers, the resolution would require the cancelling of all contracts for furniture for the houses and the return of all furniture in transit or delivered and unsold.

War Memorial Building for Toledo.

Toledo, O.—Toledo's memorial for its soldiers has taken definite form following a meeting of representative of some thirty civic, patriotic and fraternal organizations which had been called by council's memorial committee, Messrs. Charles D. Hoover, Harry M. Curtis and Cornelius C. Collins. Mayor Schreiber presided, and in stating the object of the meeting said that public sentiment had already crystalized on this subject to the extent of desiring a Memorial building, which shall be located upon the land now owned by the city and destined to become the civic center of Toledo. The mayor gave it as his judgment that the city should issue bonds for this project in the sum of $500,000, and that any additional amount needed should be raised by public subscription. This plan does not take into account the $250,000 voted several years ago by the county for the erection of a similar building in honor of those from Lucas County who had taken part in the wars of this country up to that time. In explanation of this stand, the mayor stated that he felt that the proposed memorial should be wholly within the control of the city, and that no question should ever arise that might be predicated upon joint city and county management of the building. Legislation upon the bond issue will be prepared by the mayor, for early action by council under the law by which $500,000 can be issued by the city in any one year, without a vote by the people. Prompt action will also be taken by the mayor, in naming a committee which shall be charged with the duty of securing popular subscriptions.

Expert Declares Philadelphia Housing Menace.

Philadelphia, Pa.—John Ihlder, secretary of the Philadelphia Housing Association charges that the division of housing and sanitation of the department of health and charities virtually had ceased to function since James F. McCrudden, the former chief, resigned some months ago. He said that widows working for a living for their families lost work on clothing for the Schuylkill Arsenal because officials there found housing conditions in certain parts of South Philadelphia so filthy that they considered them a menace to the soldiers. Mr. Ihlder exonerated Michael Kelly, the present acting chief, and said the blame rested on Dr. Wilmer Krusen, director of public health and charities. Mr. Kelly, according to Mr. Ihlder, holds down three jobs for a single salary and has his hands full. The trouble, according to the housing expert, lies in the fact that during all these months the division has been placed on a temporary rather than a permanent basis of organization. For that reason, he insists, the work in certain lines has gone completely to smash. As an illustration of the manner in which the falldown has been combated by the housing association, Mr. Ihlder exhibits photographs which show the condition before and after cleaning. This work, however, was performed by a contractor hired and paid by the housing association, he adds. Mr. Ihlder said, however, that as the result of a conference with the mayor, it was agreed to postpone the scheduled examination for a new chief of the division until after December 2, when the civil service had called for the applicants to appear. The reason for this postponement, Mr. Ihlder said, was that with experts being released from the Federal service there would be a better opportunity to get an expert in that line than at present. Letters were written by his association to various sanitation and housing experts and to municipal engineers, asking them to compete for the position. The only drawback he said, was that the salary should be $4,000 instead of $3,100, in order to be attractive enough to lure experts to compete for the position. Dealing with the matetr where the Federal authorities intervened and took away work on soldiers' clothing and uniforms, Mr. Ihlder referred particularly to a certain block of houses, which he said was characteristic. He said: "It has been neglected for a number of years and always was in a filthy condition. It became so bad after the thaw last spring that in a half dozen instances the rear walls fell down, although people were living there at that time. We made complains to the building inspection department and finally they demolished the half dozen in that condition. The others, forty-nine in number, are exceedingly bad. The rear alleys, as we can show by photographs, were littered with paper and refuse, and the condition was a menace to health. We expected by next spring, unless conditions were changed, the places would breed an epidemic. However, we had a contractor clean the places ourselves, and

even in its cleanly condition it is intolerable, because of the insanitary conditions of the houses, which affect the alleys." In one house of this block lived a widow with three children who obtained work on soldiers' clothing from the Arsenal. She kept her own home as neat as a pin in contrast to the other houses in the neighborhood. Officials from the Arsenal visited her, took a look at the surrounding houses in the block and took away from her the work she was doing. They said manufacture of clothing in such localities was a menace to the soldiers and could not be tolerated. Mr. Ihlder said in some cases which he cited, the houses had been neglected and on their list as dangerous to public health and comfort since 1914. The conditions under which shipworkers were housed here, Mr. Ihlder insisted, were disgraceful. Not only were they herded in rooms which provided insufficient accommodations, but in several cases beds were put in closets and men permitted to sleep there. "Here is an example," said Mr. Ihlder, showing a photgraph of the interior and exterior of a house. "It is a three-story house, and in one room on the third floor back five Hog Island workmen and a fourteen-year-old boy, the son of the family, sleep. It is barely sufficient for two persons to be lodged comfortably. Another place is a lodging house. This photograph shows the place lodges fifty men every night, and in it you see a picture of a bed placed in a dark closet. To show the increase and disposition of the complaints to the Division of Housing and Sanitation by the Housing Association, Mr. Ihlder prepared the following table:

Number of specials, January 1 to November 1:

	Complaints.	Recomplaints.	Total.
1916	58	49	107
1917	143	51	194
1918	320	102	422

Number of complaints to Department of Health, January 1 to November 1:

	Complaints.	Recomplaints.	Total.
1916	7,457	3,757	11,214
1917	7,874	2,812	10,686
1918	10,312	5,101	15,413

Including all types, January 1 to November 1:

	Complaints.	Corrections.	corrected. Per cent
1917	7,874	1,968	28.98
1918	10,312	2,240	21.71

MISCELLANEOUS

Proposes Foods Be Classed as Utilities.

New York, N. Y.—The new Governor, Alfred E. Smith, has been asked to bring about legislation as soon as possible to make such fundamental foods as bread, meat, eggs, milk and vegetables, including potatoes, public utilities, according to Laura A. Cauble, deputy commission of markets. Miss Cauble spoke for Jonathan C. Day, commissioner of markets. "Speaking for Mr. Day as well as for myself," she said, "I can say that we believe that making fundamental foods public utilities through an act of the legislature will give the people the right and the opportunity to find out what the costs of production are, will permit them to say whether present prices are justified, and will give them the power to regulate those prices downward if they are too high. Making foods public utilities would work toward better conditions for both the producer and consumer."

May Sell War Materials to Public Institutions.

Trenton, N. J.—Major Gen. George W. Goethals, Director of the Purchase, Storage, and Traffic Divisions of the War Department, has approved a suggestion made by Burdette G. Lewis, New Jersey State Commissioner of Charities and Corrections, that state and municipal institutions have an opportunity to buy at reasonable cost surplus materials which the army no longer wants and the states need badly for their wards. In reply to a letter in which Dr. Lewis made the suggestion, General Goethals wrote: "Your plan for the disposition of surplus stocks is a very practical one. A surplus property division has been created and a catalogue of such material now is in preparation." Mr. Lewis is asked to have the state purchasing agent take up the matter with L. H. Hartman, chief of the new division, at Washington. A further suggestion of Mr. Lewis that the state of New Jersey be allowed to purchase barracks no longer needed by the War Department, move them to state institutional property, and thus relieve over-crowding and care for dependents now on the waiting list also is receiving consideration.

LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Liability of City Treasurer for Deposited Funds.

(Mo.) Where municipal funds are delivered to a city treasurer by the mayor and board of aldermen, the treasurer under Rev. St. 1909, § 9395, is bound to account for such funds at his peril, and, regardless of power under section 9371 to manage and control such funds, the mayor and board of aldermen cannot even by ordinance free such treasurer from his liability as such and clothe him with the character of an agent.—University City v. Schall, 205 S. W. 631.

Where a city treasurer deposits funds of a municipality in a bank, and the deposit is not special in character, the liability of the treasurer is absolute.—Id.

Doubtful Municipal Contract—Construction in Favor of Public.

(Wash.) Where the language of a municipal contract leaves the intention of the parties doubtful, it is ordinarily construed most favorably to the public.—Puget Sound International Ry. v. City of Everett, 175 P. 40.

Insubordination of Employe—Sickness—Dismissal.

(N. Y. Sup.) Where a city employe having served faithfully for 20 years, commits acts of insubordination while in a mentally deranged condition, or in a condition of extreme nervous prostration, he should not be dismissed, but at most should be retired for disability, or temporarily suspended.—People ex rel. Murray v. Connolly, 172 N. Y. S. 48.

Where city employe, after 20 years' faithful service, was tried for insubordination and dismissed without a medical inquiry, although he claimed sickness and nervous breakdown, the Supreme Court, on certiorari to review commissioner's determination, where record suggests that employe, at time of committing acts complained of, was suffering from extreme nervous prostration, will annul determination and order new hearing.—Id.

City Purchase of Right of Way—Opening Street.

(Fla.) A city can purchase a right of way over the lands of a railroad and pay for it in cash, or it may in consideration of benefits which it derives from the opening of a street over the railroad's land, take upon itself the expense of protecting persons and property using the street.—Florida East Coast Ry. Co. v. City of Miami, 79 So. 682.

Power to Create Transit Commission—Initiated Ordinance.

(Ohio) Initiated Ordinance No. 45222 of the city of Cleveland, entitled "An ordinance to provide for the appointment of a rapid transit commission," is valid, though it does not specify in terms the powers and duties of the commission; it being sufficient to refer to the statute defining the functions of such commissions.—State v. Otis, 120 N. E. 313.

An initiated ordinance repeals a prior ordinance in so far as the two ordinances are in conflict.—Id.

Cleveland City Charter, § 77, creating a city plan commission, with power to control "the plan, design, and location of public buildings, harbors, bridges, viaducts, street fixtures," etc., does not preclude the creation by ordinance of a rapid transit commission with the powers conferred by Gen. Code, § 4000—16 et sequ.—Id.

NEWS OF THE SOCIETIES

Jan. 13.—AMERICAN INSTITUTE OF CONSULTING ENGINEERS. Annual meeting, New York City. Deputy secretary, B. Etchelle, 35 Nassau St., New York City.

Feb. 18-21, 1919.—AMERICAN ROAD BUILDERS' ASSOCIATION. Sixteenth annual convention and Ninth American Good Roads Congress under the auspices of the A. R. B. A., Hotel McAlpin, New York, N. Y. Secretary, E. L. Powers, 150 Nassau street, New York, N. Y.

Nov. 12-14, 1919.—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Bloomington, Ill.

National Highway Traffic Association.

At the public meeting of the National Highway Traffic Association, held at the Automobile Club of America on December 16, the subject of "Segregated Traffic Streets" was discussed from many angles.

Dr. John A. Harriss, deputy police commissioner in charge of traffic, New York City, stated that it was his impression that the order restricting certain thoroughfares for the use of commercial and passenger vehicles, respectively, which became effective last September, has been eminently effective and has proven satisfactory to the public.

Confronted with an almost unlimited number of vehicles of all types, and having but a limited amount of roadway space accessible for their use, it became an absolute necessity to so distribute the traffic on the streets as to minimize the possibility of a serioue general traffic congestion.

Provision had to be made, of course, for exceptions with compliance by vehicles ordinarily granted the right of way under the law, and for the use of any thoroughfare, irrespective of class designation, by vehicles receiving goods or making deliveries, or transacting any other business, but care has had to be exercised in the case of such vehicles in order to prevent an abuse of the privilege thus afforded them, and to this end they are required to enter and leave by the nearest intersecting thoroughfare. A further concession is granted such vehicles when transacting business at places but a few blocks distant from each other, but they are required to resort to the particular thoroughfare set aside for their use immediately upon the completion of their business.

William P. Eno, chairman, District of Columbia Highways Transport Committee, presented the following conclusions: The segregation of special kinds of traffic to certain streets, I believe, should be put into effect only after a more careful study of the subject than has evidently been given it. I do not think it is necessary or advisable to exclude light traffic (and by this I refer not only to light passenger vehicles but to light delivery wagons and to any other light, fast-moving vehicles which do not obstruct traffic) from any street but I do believe that all vehicles when moving slowly should be forced to keep near the right hand curb. On some important shopping streets, such as Fifth and Madison avenues, however, heavy, slow-moving vehicles should be excluded during congested hours and cruising cabs should be obliged to move briskly when in the stream of traffic in order not to obstruct following vehicles. My opinion is that segregated traffic is a mistake except during congested hours when it is highly desirable to deflect heavy, slow-moving vehicles from important shopping streets at the discretion of the police.

Arthur G. McKeever, president, Ajax Trucking Company, stated that it was a fundamental principle to associate on the street set aside for segregated traffic vehicles capable of maintaining the same average of speed in travel, and in starting and stopping.

Robert Lee Morrell, president of the Metropolitan Consulate of the American Automobile Association, stated that it was essential that the existing regulations in this city be modified. For example, Lafayette street and Fourth avenue should be available for both commercial vehicles and passenger cars.

It is essential that existing regulations segregating traffic be modified if not entirely suspended during periods of heavy snow fall, for the following reason: It is the custom in clearing the snow from the streets of this city to clear first the main north and south thoroughfares, the side streets come last and often the snow is left there to melt. In other words, during the period of deep snow the side streets are all but impassable. Present regulations require commercial vehicles to make such extensive use of side streets that a serious tie-up may be expected during a period of deep snow.

Richard W. Meade presented a number of resolutions, in connection with which Mr. Meade stated that the most useful contribution he could make to the subject is some specific illustration of how the regulations would work if they were enforced or enforceable. While these illustrations were selected to throw into strong relief the harmful effects of the regulations and the fact that instead of conducting to safety they must actually tend the other way through the increase of vehicular mileage and crossings of avenue traffic, yet they are entirely typical in character, and in the case of the delivery wagon in extent also, of what would be daily occurrences if the regulations were observed or enforced. To say that the traffic officers have discretion to waive the regulations in any case where they would result in hardship is not a satis-

(*Continued on page 21.*)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Walker County Commissioners, LaFayette, La., will construct a BRIDGE across Cane creek of two spans, reinforced concrete. The consulting engineers are the Cushman-Farleigh Engineering Co.

Tracy, Minn., is to make PAVING IMPROVEMENTS, involving the paving of twenty-five blocks in the business and residential section to cost about $75,000. Plans were prepared by the consulting engineer, J. W. Shaffer.

The state legislature will be asked to authorize the construction of a CENTRAL POWER PLANT at Grand Forks, N. D., to cost $150,000. The preliminary plans were made by the consulting engineers, Rose & Harris.

The Adair Salt River Drainage District, Kirksville, Mo., is to build a DRAINAGE SYSTEM consisting of five and a half miles of drainage canal, involving 185,000 cubic yards of excavation. The consulting engineer is James E. Bonnell.

Martinez, Cal., is to build a reinforced concrete and earth RESERVOIR, 1,500,000-gallon capacity, and other WATERWORKS IMPROVEMENTS, according to plans prepared by the consulting engineering firm of Olmsted & Gillelen.

Plans are being finished for the construction of a SEWAGE DISPOSAL PLANT at Milton, Pa. The consulting engineer is Alexander Potter.

Geneva, Neb., is asking for bids for WATERWORKS IMPROVEMENTS, according to plans prepared by the consulting engineering firm of Grant & Fulton.

WATERWORKS IMPROVEMENTS are to be made by the city of Pipestone, Minn., to cost $77,000, according to plans prepared by the consulting engineer, L. P. Wolff.

Ferndale, Mich., plans making WATERWORKS IMPROVEMENTS, involving the building of water mains to cost $99,000, and a SEWERAGE SYSTEM to cost $300,000. The consulting engineer is George Jerome.

Tentative plans have been prepared and submitted by the consulting engineer, J. E. Greiner, for the construction of a BRIDGE in Baltimore county, Baltimore, Md. The bridge is to be nine miles in length, extending over Chesapeake bay, and the plans include reinforced concrete double decked bridge and double railway tracks. Two widths were suggested, one 40 feet to cost $18,000,000 and one 30 feet to cost $12,000,000.

INDUSTRIAL NEWS

War Industries Board Ends Work.

The War Industries Board ceased its functions January 1, as was officially announced by Bernard M. Baruch, the Chairman. Certain activities of the board, according to the wish of the President, will be transferred to other departments of the Government and will continue in operation for the present. The War Trade Board will take over most of the activities of the War Industries Board, which the administration feels necessary should remain in existence for some time.

Chairman Baruch made a statement, which reads in part:

"It has been arranged that the powers and duties of the Division of Planning and Statistics of the War Industries Board shall, on Jan. 1, be taken over by the War Trade Board, along with such officials or employes of the Board as may be necessary.

"The Price Fixing Committee of the War Industries Board will continue to function until such of the prices already fixed by the committee, as will not expire on or before Jan. 1, shall have expired.

"In thus announcing the final windup of the War Industries Board, the chairman cannot refrain from once more expressing his great appreciation of the devoted efforts of those associated with him in the direction of the Board's activities, and of the whole-hearted and loyal co-operation of the industries of the country."

New Form of Steel Contract.

At a meeting of the board of directors of the American Iron and Steel Institute, held in Pittsburgh, a new form of steel sales contract was approved, so drawn up as to make the contract binding upon both buyer and seller. The object is to reform trade practice in the sale of finished steel products, as for many years a very considerable portion of the finished steel sold, while nominally under definite contract, really represented an option given. Sales of coke, iron ore, pig-iron, and unfinished steel have always been regarded as outright sales, and the buyer was expected to live up to the contract even if the market went against him.

In the case of many finished steel contracts the buyer would refrain from specifying if the market declined, and the mill would make a price adjustment. The practice is commonly regarded as one of the relics of the "controlled market" when it was difficult to induce buyers to contract ahead freely unless they were assured that they would be taken care of in case an accident happened to the market. If the days of the "controlled market" passed with the Gary dinner period, as steel producers represent is the case, the producers have lost the beneficial part of the system while they are still saddled with the inconvenient part.

Steel producers have not formally announced adoption, individually, of the new contract form, but are expected to do so before the end of the year. Many in the trade look to the Carnegie Steel Company to take the lead on adopting the new contract, as it is frequently held that this company, passively at least, has been largely responsible for the continuance of the practice.

The new contract form provides for compensating damages. If the buyer fails to specify on a declining market he must reimburse the seller. If the seller fails to deliver on a rising market, he must reimburse the buyer. In each case the measure of the reparation is to be the difference between the contract price and the open market price at the time of the failure to specify or to deliver, as the case may be. In order to simplify adjustments under the contract it is provided that in no case is the reparation to be less than 5 per cent. of the contract price. Ten per cent. was originally contemplated, but with the present high prices this was held to figure out too large an amount in dollars per ton and the smaller figure has been adopted.

CLEANING OUTFIT.

For Pumping Out Contents of Cess-Pools, Catch-Basins, Vaults, Etc.

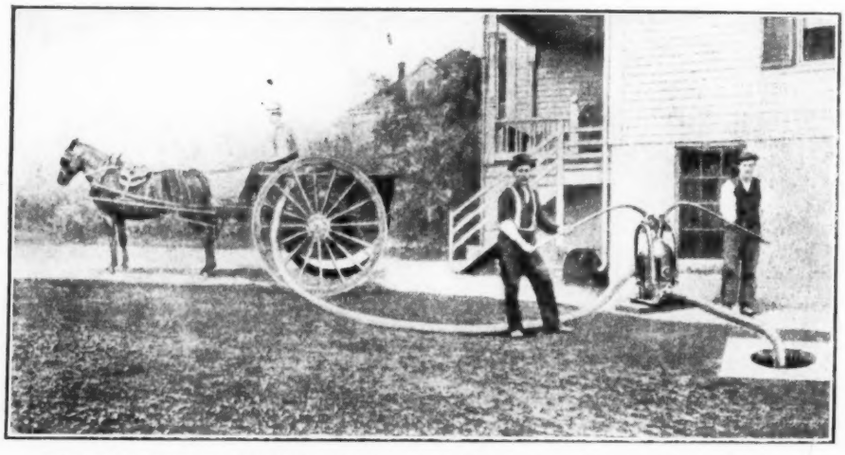
The frequent need by municipalities of all sizes for an economical, practical and adaptable outfit for cleaning out such potential hazards as cesspools, catch-basins, vaults, etc., has been met by a combination of standard Holzbog wagon and an Edson diaphragm pump. The outfit is easily and cheaply operated, is always available for service, and is durable.

A standard 54-cubic foot cart is used. The specially-shaped tank is made of steel, thoroughly riveted and watertight. The consequent advantages in cleanliness and absence of nuisance are obvious. The lids, of which there are two, one in front and one in rear, allow of completely filling the body. They are made with deep flanges, close fitting, and when down, are securely locked in place. The rear lid is operated by a spring handle on the side of the body and can be locked open at any of several positions when the vehicle is being loaded or dumped.

A very important and convenient feature of the cart is the low hang, which allows of very easy loading. The distance from ground to top of tank when level is about 51 inches. This may be reduced considerably by tipping the tank at a slight angle. The tank is well balanced, so that the vehicle even when full travels easily, and without undue strain on the horse. The tank being adjustable at any any angle, the load is completely discharged without raking out, and for convenience in washing, etc., the body can be locked in any position and the interior thoroughly cleansed. Dumping is by simple gear arrangement instead of by chain.

All the castings in the vehicle are made of steel, malleable iron and pig iron, mainly of the first two. The axle is built up of five pieces, which allows that portion of it going through the body to be encased in a steel boiler tube, expanded at the ends. This eliminates the possibility of leakage at these points. All metal parts are made and finished to exact standard patterns and repairs can therefore be made quickly and cheaply and new parts will almost always fit without further machining. Archibald iron hub wheels of best quality are used, but Warner, Sarven or plain wood hub may be had if desired. The weight of this standard two-wheel vehicle is 1,700 pounds.

The diaphragm pump is made for 3-inch suction and discharge hose, has side inlet and outlet and large hand-hole for cleaning. It weighs 270 pounds, occupying a space 15x15x42 inches high. It holds 3,500 gallons of water or is able to handle semi-fluid material through 25 feet of suction and through up to 200 feet of discharge hose with the labor of only two men.



PUMPING OUTFIT CONSISTING OF HOLZBOG WAGON AND DIAPHRAGM PUMP FOR CLEANING CESSPOOLS, CATCHBASINS, ETC.

It is supplied with operating handles and odorless cap if desired.

The cart described is one of a line of carts for sanitary uses and for transporting garbage, cement, etc. They are made with two or four wheels, for one or two horses. They range in capacity from 37 to 80 cubic feet. The "Columbian" type is of similarly strong construction but has a rear scoop body, without lids; it has no dumping gear, but a special leverage dumper; it has no axle drop or tube so that the body is higher than in the other type.

The carts described are made by Geo. H. Holzbog & Bro., Jeffersonville, Ind., which sells the whole pumping outfit.

Surplus Government Auto Vehicles Taken by Industry.

The surplus stocks of automobiles and trucks in the War Department will be taken up by the automobile industry. An agreement to this effect has been made between representatives of the auto manufacturers and officials of the War Department, the action having been taken to prevent a disorganization of the business by a possible flooding of the market with Government machines. The War Department announces, however, that there is no immediate probability of this, because the indications at present are that the Government machines will be needed for some time, and care will be taken to cause the trade as little disturbance as possible.

The American-La France Fire Engine Co., Elmira, N. Y., has shipped the following orders for fire apparatus: Superior, Wis., type 12 triple comb. chem. eng. and hose car, type 12 comb. eng. and hose car; La Salle, Ill., type 12 triple comb. chem. eng. and hose car.; Logansport, Ind., type 14 city service truck; Philadelphia, Pa., type 12 triple comb. chem. eng. and hose car; Wapakoneta, Ohio, type 12 triple comb. chem. eng. and hose car; Red Bank, N. J., type 75 triple comb. chem. eng. and hose car; Waterbury, Conn., type 12 pumping engine and hose car; Manitowoc, Wis.; type 12 triple comb, and hose car; Central City, Neb., Brockway combination; Central City, Neb., Brockway combination; Martinsburg, W. Va., type 12 triple comb. chem. eng. and hose car; Camp Mills, L. I., N. Y., triple comb. chem. eng and hose car; Cuyahoga Falls, Ohio, type 12 triple comb. chem. eng. and hose car; Cicero, Ill., comb. chem. eng. and hose car; Providence, R. I., type 17 tractor; Monte Vista, Colo., type 40 comb. with junior pump; Cambridge, Mass., type 31 75-ft. aerial truck; Portland, Me., type 40 triple comb. chem. eng. and hose car; Framingham, Mass., type 12 triple comb. chem. eng. and hose car; Waukegan, Ill., triple comb. chem. eng. and hose car; Portland, Me., triple comb. chem. eng. and hose car; Framingham, Mass., type 12 triple comb. chem. eng. and hose car; Waukegan, Ill., type 12 triple comb. chem. eng. and hose car; Portland, Me., type 12 triple comb. chem. eng. and hose car; St. Louis, Mo., type 14 comb. chem. eng. and hose car; Winston-Salem, N. C., type 14 comb. chem. eng. and hose car; Spencer, Iowa, type 12 triple comb. chem. eng. and hose car; Waltham, Mass., type 14 city service truck chassis. The company has received the following orders for equipment: Annapolis, Md., type 75 comb. with jr. pump; Chester, Pa., type 12 triple, type 31 75-ft. aerial truck; Hastings, Mich., 40 comb. chem. eng. and hose car; Atlas Powder Co., Perryville, Md., Brockway type D chemical engine.

The Western Paving Brick Manufacturers' Association, Dwight Bldg., Kansas City, Mo., announces that Major Clark R. Mandigo, engineer, has been honorably discharged from the army after nineteen months' service, including service with the A. E. F., and has returned to the association in his former position of consulting engineer.

"Watertight Concrete."

This is the subject of a recent publication of timely interest issued by the Hydrated Lime Bureau (now the Construction Bureau) of the Lime Association, 503 Riggs bldg., Washington, D. C. This bulletin, No. F-3-2, describes and illustrates very interestingly the whole subject of obtaining watertight concrete through the use of hydrated lime. The data is presented in a very logical and convincing manner, beginning with general considerations and a clear study of the technical and economic requirements of a good waterproofing material. Authoritative facts about hydrated lime are presented, including material from the U. S. Bureau of Standards. A large number of examples of the use of hydrated lime in structures of a watertight character are described and shown in excellent illustrations. These include the Stony Brook sewer, Boston, Mass.; the Stockton street tunnels and Twin Peaks, San Francisco, Cal.; the Superior street viaduct, Cleveland, O.; the St. Louis, Mo., filtration plant; new Austin, Tex., dam; reservoir at Waltham, Mass., and concrete water tank at Kokomo, Ind.

This bulletin, which is issued for general distribution, should be of real value to all interested in concrete structures.

INDUSTRIAL NEWS

(*Continued from page* 19)

factory answer, because, in the first place, such appeals and decisions are unpractical in most cases, and second because regulations that in their general application require variation every hour and minute of the working day are clearly unworkable.

He gave a specific case of a light delivery wagon having ten deliveries to make in a small district. Without restriction the wagon could make these deliveries by running about three miles, crossing one avenue seven times and not crossing the traffic of any other avenue. To comply with the regulations the vehicle would be compelled to run about seven miles—more than twice as far—and make a total of 62 crossings of avenue traffic.

Other speakers were S. W. Taylor, president, Rider and Driver; George Keegan, of the Interborough Railway; Charles G. Bond, counsel of the Motor Truck Association of America; Ernest P. Goodrich, former consulting engineer to the president of the Borough of Manhattan; and Joseph K. Orr, president, New York Team Owners Association.

At the conclusion of the discussion Mr. Meade's resolutions were referred, with power to act, to a special committee to be appointed by the president. These resolutions declared that the regulations must be radically revised.

American Society of Landscape Architects.

A special meeting of the American Society of Landscape Architects was held in Washington, Dec. 7.

"This meeting was called," said Professor J. S. Pray, of Harvard, president of the society, "to consider how we may best be of service here and overseas during the reconstruction period. The country is faced, for instance, by a large building program. Better and more economical results will be secured by the cooperation of the landscape architect. He is likely to be called in more and more upon these and city planning problems."

A medalion was presented to F. L. Olmsted by the society at the convention dinner in appreciation of his part in the winning of the war. It was pointed out that as his father, the great artist and landscape architect, Frederick Law Olmsted, had employed his powers of organization and his sturdy good sense most effectively, as head of the Sanitary Commission during the Civil War, so the son had made a similar contribution during the present war to the housing of both troops and munition workers. The medalion represents the Goddess Vesta, whose charge it is to "keep the home fires burning," hand in hand with Mercury, the Roman God of Industry.

"Of the 84 members of the American Society of Landscape Architects conducting their own offices, 43 have been called in one way or another into government service, either by the Housing Bureau, the Construction Division of the Army or the Shipping Board," said Mr. Olmsted, who is now serving as chief of the Town Planning Division of the U. S. Housing Bureau. "This is a remarkable record, especially since landscape architecture is considered by the man in the street as an occupation only for settled conditions, and even something of a luxury. The fact is that in this emergency, the landscape architect was found preeminently qualified to serve in one field of

town planning required by the government in laying out cantonments for troops, and industrial housing developments for war workers. Consequently he was drafted to this service. If our experience in the Housing Bureau has proved anything," continued Mr. Olmsted, it is the possibility and value of a thoroughgoing cooperation between the architectural, town planning and engineering professions. In our office, each has been represented by a division, all working together at adjacent desks and all assisting in the solution of every problem. It offers a fine promise of the future for building and land subdivision in all its branches."

The convention was held in Washington on account of the many landscape architects who are working in the U. S. Housing Bureau and the Construction Division of the Army. Its chief work was to consider how the society can be of further service and how the work in town planning and industrial housing which the U. S. Housing Bureau has so admirably started may not be lost.

Professional men from California, Missouri, Minnesota, Ohio, Michigan and many of the more Eastern states were present.

The president of the society is Professor J. S. Pray, Cambridge, Mass., and the secretary, A. F. Brinkerhoff, 527 Fifth avenue, New York City.

National Drainage Congress.

At the seventh annual meeting of the National Drainage Congress which was held in Chicago, Dec. 13 and 14, resolutions favoring the appropriation of a billion dollars by the Government for the reclamation of wet lands; the selling of the best reclaimed lands available to returned soldiers and sailors by the Government at actual cost; the creation of a federal department of public works, with a place in the cabinet for its head, and the betterment of waterways, roads, and other internal improvements, were adopted.

President Wilson was asked to appoint the Waterways Commission of seven members as authorized by the law on the subject passed in August, 1917, and besides the army engineer required by law to head the commission, to appoint not less than three civil engineers.

The following projects were recommended: The Atlantic coast waterway; the Lake Erie and Ohio River Canal; the Ohio River improvement; storage reservoirs on the Alleghany, Monongahela and other rivers, as means of flood control and aids to navigation; the Lake and Gulf waterway from Chicago; and the improvement of the Upper Mississippi, the Missouri and the Columbia Rivers.

Federal aid for drainage of swamp and overflow lands, similar to that already extended by the Government for irrigation, was urged. As local projects of this class have been devised usually with little regard to general plans covering the valleys in which they are located, the Governors of the states are asked to consider the desirability of unifying state agencies responsible for water resources, and the desirability of advocating the passage of state acts to revise the drainage laws. Related to this was a resolution authorizing the president of the drainage congress to appoint a committee to report some plant for stabilizing the value of drainage bonds and other securities for improvement works.

Diversion of flood waters and their subterranean storage for the benefit of the semi-arid lands was also urged with the recommendation that Congress provide necessary funds.

Plans were favored for providing good agricultural lands for soldiers and sailors returning to civil life, such lands to be sold at cost and upon favorable terms.

Highway development was indorsed and alliance with the National Highway Association was proposed. A telegram was sent Secretary McAdoo protesting against the revocation of contracts for barge construction or interior waterways.

The following officers were elected: President, Edmund T. Perkins, Chicago; vice-presidents, F. H. Newell, Urbana, Ill.; A. J. Kelly, Jr., Pittsburgh; John A. Kruse, New Orleans; J. L. Craig, Stockton, Cal.; H. M. Sparboe, Webster City, Ia.; treasurer, Charles G. Dawes, Chicago.

New England Waterworks Association.

The annual meeting of the New England Waterworks Association will be held at the Hotel Brunswick, Copley Square, Boston, Mass., on Wednesday, January 8.

In the morning the executive committee will meet at headquarters, in the Tremont Temple.

At 1 p. m. lunch will be served at the Hotel Brunswick. The meeting will follow the luncheon, beginning with reports by the secretary, treasurer, editor and auditors.

The following committees will then report:

"Standard Specifications for Cast Iron Pipe." F. A. McInnes, Chairman.
"Standard Specifications for Fire Hydrants." H. O. Lacount, Chairman.
"Statistics of Water Purification Plants." Geo. C. Whipple, Chairman.
"Leakage of Pipe Joints." F. A. Barbour, Chairman.
"Proposed Standard Schedule for Grading Cities and Towns of United States with reference to their Fire Defences and Physical Condition." Frank A. McInnes, Chairman.
"A National Water Law." Caleb M. Saville, Chairman.
"Uniform Accounting." Albert L. Sawyer, Chairman.
"Standard Specifications for Meters." Charles W. Sherman, Chairman.
"Revenue from Fire Services." W. C. Hawley, Chairman.
"Public Hearing of the American Society of Mechanical Engineers for the Discussion of the Power Test Codes of that Society." Caleb M. Saville, Chairman.
"Frozen Service Pipes." Frank J. Gifford, Chairman.
"Priorities." Willard Kent, Chairman.

The annual address of the president, Carleton E. Davis, Philadelphia, Pa., will then be delivered. Following this, new officers will be elected.

New Jersey State Association of County Engineers.

A meeting of the New Jersey State Association of County Engineers is to be held January 10 and 11 at "The Washington," Newark, N. J. James Logan, Monty Holley, is president, and T. J. Wasser, Jersey City, is secretary.

Michigan Engineering Society.

The annual convention of the Michigan Engineering Society will be held at Flint, Mich., January 21 to 23, 1919. The subjects covered will include roads and bridges, drainage, sanitary engineering, legislation, municipal engineering, hydro-electric engineering and surveying. The president of the Society is E. D. Rich and the secretary Wm. W. Cox, 508 West Madison street, Lansing, Mich.

Trunk Highway Association.

At the recent meeting in Chicago of the Joint Highway Congress held under the auspices of the American Association of State Highway Officials and the Highway Industries Association, were present representatives of twelve organized trunk line highways. Preliminary arrangements were made to form these into an association and to hold a meeting at Kansas City as soon as possible after Jan. 15. The newly formed organization tendered its support to the associations holding the congress, for a broad-gage policy for the construction of a system of national highways not to exceed 50,000 miles, to connect the important centers of population and industry, without regard to state lines.

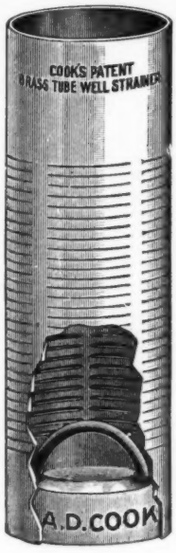
H. O. Cooley, of Minneapolis, representing the Yellowstone Trail, and Wesley L. Connett were elected president and secretary, respectively.

PERSONALS

Whitmore, Charles A., Visalia, Cal., has been appointed to the California state highway commission, succeeding Henry J. Widenmann, who died recently.

Stern, Charles F., one of the three members of the California Highway Commission, has been appointed state superintendent of banks.

Campbell, Archibald W., who has been deputy minister of railways and canals for the Dominion of Canada, has been appointed a commissioner to investigate and report to the Canadian Government on the question of good roads construction. Mr. Campbell was for many years deputy minister of public works for Ontario.



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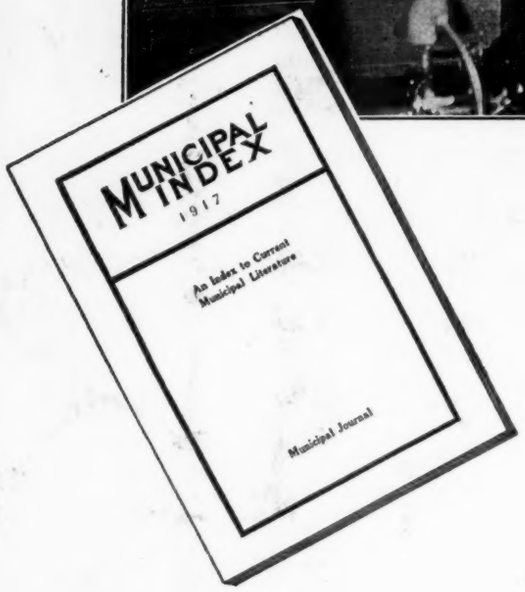

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